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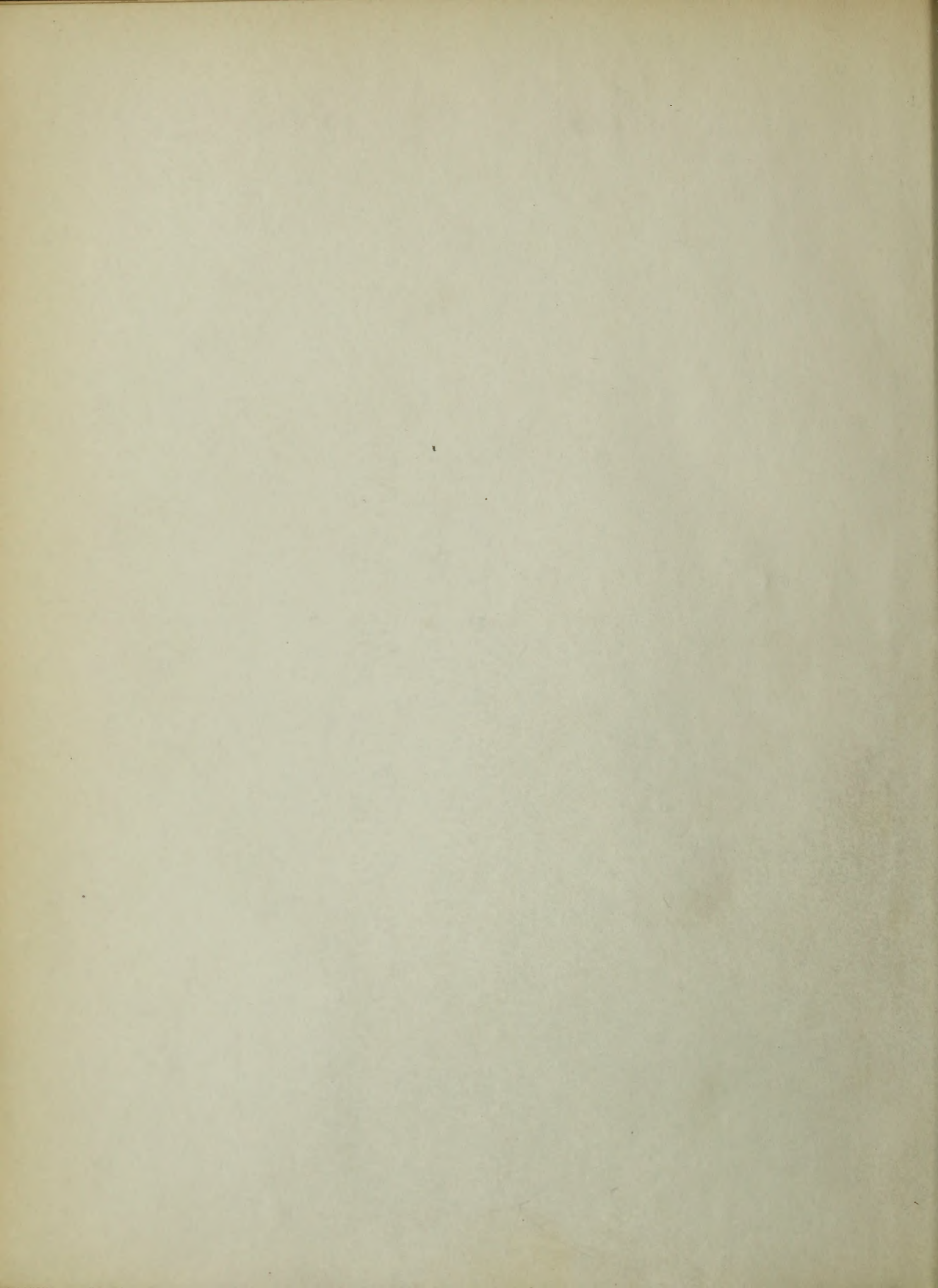
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THE  
APPLICATION AND ADMINISTRATION  
OF THE  
BEDAUX "POINT SYSTEM"  
OF  
WAGE INCENTIVE AND LABOR CONTROL

A THESIS  
PRESENTED TO THE FACULTY  
OF THE  
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OF  
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AS A PARTIAL REQUIREMENT FOR THE  
DEGREE OF  
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BY  
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# FOREWORD





## FOREWORD

Management, the unseen force which guides all that is physical within a factory seems, by far, to be the greatest factor of the present industrial age.

Machinery and materials may be put to work, workers may labor, but without adequate management to guide their operations into profitable channels, to distribute the results of their work effectively, and to govern their operations during performance, this performance may become so uneconomic as to cease entirely.

We are accustomed to think of the physical thing, the huge plant and the wonderful machinery. We, of course, instinctively realize that some human force must have been necessary to create them. But the methods of creating the force are little thought of, even by those who come into daily contact with it. Most of us, particularly if we have lived in a large manufacturing center, see so much of the physical side of industry that we do not think of the directing force but rather the results of the application of that force. We begin to regard enormous manufacturing plants, with their thousands of workers creating the product by combined, directed effort, as one of the common things in life. Seldom do we stop to consider how these great plants came into being, how and by whom they were organized, or the effect of their presence and policies of operation on the life of the community in which they exist. We merely accept them as we find them.

Only when a strike occurs or when business depression quiets an







industry do most of us stop to think of the directing forces "behind the guns".

Through a great deal of publicity, in periodicals and the daily press, in the past few years we have come to the realization that there exists some hidden force that controls the operations of our industries. Today, the method of management, rather than the nature of the machinery, is the basis of the estimate of a plant's value to the community. Executives have come to talk management, periodicals have come to talk management and the general public is beginning to realize that in the force of management lies the way to better understanding of industrial problems and through that to better community life. The test of the present industrial system is its ability to adjust itself to modern conditions and it will be management that will largely determine whether or not it will meet that test.

An outstanding subject in industrial management that has received serious consideration and study during the past few years is that of wage incentives. Practically all factories now have their own specialists who time study operations and recommend or set production rates or standards.

The employee's pay envelope is the heart of all industrial relations and to a large degree the success and prosperity of American industry is the result of adequate and just wages. To the employee the pay envelope is the most vital fact connected with his job. It is essential that his wages provide him with a regular and adequate source of income. To the employer and the community it is equally important that the industry be conducted with the greatest possible efficiency,





so that the cost of the finished product will be at a minimum compared to prevailing wage levels.

An incentive plan of wage payment properly installed and administered, should serve the best interests of all parties concerned which means maximum pay for maximum production. Increased employee earnings and increased production, with lower unit costs, are the most important results obtained through the use of incentive plans of wage payment. Often there are other results obtained which in themselves alone justify the use of an incentive plan. Some of these incidental results are decreased labor turnover, improved employee morale, lower supervisory costs, better cost control, and improved quality of product. The last named is rather surprising in view of the opinion generally held that any attempt to increase production must be accompanied by a decrease in quality.

The increased production obtained immediately after the application of a plan of wage payment is not always due to the plan itself but is aided materially by the correction of such conditions as machine speeds and feeds and changes in the methods of manufacture. The necessity for these changes is made evident at the time of the operation analysis.

There are three fundamentals in every job:

- (a) Quality of work.
- (b) Quantity of work.
- (c) Economy in the use of material.

Whether the attainment of these objectives is accomplished by the application of the incentive plan itself or by correctives, indicated





above, makes no difference. The important thing is that they be attained so that the resultant economy may be had.

A wage incentive plan properly selected and applied leads to constructive conditions of harmony, morale and productive efficiency within the organization.

Several chapters of introductory material are given with the intention that they shall provide a foundation for the later discussion.

The Bedaux "point system" is playing its part in the field of industrial management by providing a practical plan to effectively control labor in industry. The business structure of industry is today so complex that each phase of the business is a field of study in itself. Mass production has brought into existence a group of specialists in management as well as in the field of production. In order to guide the modern business in its course many control mediums are set up which reflect at any given time the status of the business. The use of budgets, market analyses, inventory control and the many types of production control are familiar to the student of business as it exists today.

The Bedaux "point system" is one of the above mentioned control mediums. It finds its use in the field of labor control. Labor cost in most instances provides the base for the determination of the cost of manufacture. Due to this fact it is necessary to keep this item in the cost of production at a minimum. The "point system" is a valuable aid in the effective use of labor to coordinate effort and





production to the realization of this objective.

The scope of this thesis is a detailed study of the application and effective administration of the "point system" in industry.





# TABLE OF CONTENTS

CHAPTER I	THEORY OF THE SUBJECT	1
1.	THEORY OF THE SUBJECT	1
2.	THEORY OF THE SUBJECT	2
3.	THEORY OF THE SUBJECT	3
4.	THEORY OF THE SUBJECT	4
5.	THEORY OF THE SUBJECT	5
6.	THEORY OF THE SUBJECT	6
7.	THEORY OF THE SUBJECT	7
8.	THEORY OF THE SUBJECT	8
9.	THEORY OF THE SUBJECT	9
10.	THEORY OF THE SUBJECT	10
11.	THEORY OF THE SUBJECT	11
12.	THEORY OF THE SUBJECT	12
13.	THEORY OF THE SUBJECT	13
14.	THEORY OF THE SUBJECT	14
15.	THEORY OF THE SUBJECT	15
16.	THEORY OF THE SUBJECT	16
17.	THEORY OF THE SUBJECT	17
18.	THEORY OF THE SUBJECT	18
19.	THEORY OF THE SUBJECT	19
20.	THEORY OF THE SUBJECT	20
21.	THEORY OF THE SUBJECT	21
22.	THEORY OF THE SUBJECT	22
23.	THEORY OF THE SUBJECT	23
24.	THEORY OF THE SUBJECT	24
25.	THEORY OF THE SUBJECT	25
26.	THEORY OF THE SUBJECT	26
27.	THEORY OF THE SUBJECT	27
28.	THEORY OF THE SUBJECT	28
29.	THEORY OF THE SUBJECT	29
30.	THEORY OF THE SUBJECT	30
31.	THEORY OF THE SUBJECT	31
32.	THEORY OF THE SUBJECT	32
33.	THEORY OF THE SUBJECT	33
34.	THEORY OF THE SUBJECT	34
35.	THEORY OF THE SUBJECT	35
36.	THEORY OF THE SUBJECT	36
37.	THEORY OF THE SUBJECT	37
38.	THEORY OF THE SUBJECT	38
39.	THEORY OF THE SUBJECT	39
40.	THEORY OF THE SUBJECT	40
41.	THEORY OF THE SUBJECT	41
42.	THEORY OF THE SUBJECT	42
43.	THEORY OF THE SUBJECT	43
44.	THEORY OF THE SUBJECT	44
45.	THEORY OF THE SUBJECT	45
46.	THEORY OF THE SUBJECT	46
47.	THEORY OF THE SUBJECT	47
48.	THEORY OF THE SUBJECT	48
49.	THEORY OF THE SUBJECT	49
50.	THEORY OF THE SUBJECT	50
51.	THEORY OF THE SUBJECT	51
52.	THEORY OF THE SUBJECT	52
53.	THEORY OF THE SUBJECT	53
54.	THEORY OF THE SUBJECT	54
55.	THEORY OF THE SUBJECT	55
56.	THEORY OF THE SUBJECT	56
57.	THEORY OF THE SUBJECT	57
58.	THEORY OF THE SUBJECT	58
59.	THEORY OF THE SUBJECT	59
60.	THEORY OF THE SUBJECT	60
61.	THEORY OF THE SUBJECT	61
62.	THEORY OF THE SUBJECT	62
63.	THEORY OF THE SUBJECT	63
64.	THEORY OF THE SUBJECT	64
65.	THEORY OF THE SUBJECT	65
66.	THEORY OF THE SUBJECT	66
67.	THEORY OF THE SUBJECT	67
68.	THEORY OF THE SUBJECT	68
69.	THEORY OF THE SUBJECT	69
70.	THEORY OF THE SUBJECT	70
71.	THEORY OF THE SUBJECT	71
72.	THEORY OF THE SUBJECT	72
73.	THEORY OF THE SUBJECT	73
74.	THEORY OF THE SUBJECT	74
75.	THEORY OF THE SUBJECT	75
76.	THEORY OF THE SUBJECT	76
77.	THEORY OF THE SUBJECT	77
78.	THEORY OF THE SUBJECT	78
79.	THEORY OF THE SUBJECT	79
80.	THEORY OF THE SUBJECT	80
81.	THEORY OF THE SUBJECT	81
82.	THEORY OF THE SUBJECT	82
83.	THEORY OF THE SUBJECT	83
84.	THEORY OF THE SUBJECT	84
85.	THEORY OF THE SUBJECT	85
86.	THEORY OF THE SUBJECT	86
87.	THEORY OF THE SUBJECT	87
88.	THEORY OF THE SUBJECT	88
89.	THEORY OF THE SUBJECT	89
90.	THEORY OF THE SUBJECT	90
91.	THEORY OF THE SUBJECT	91
92.	THEORY OF THE SUBJECT	92
93.	THEORY OF THE SUBJECT	93
94.	THEORY OF THE SUBJECT	94
95.	THEORY OF THE SUBJECT	95
96.	THEORY OF THE SUBJECT	96
97.	THEORY OF THE SUBJECT	97
98.	THEORY OF THE SUBJECT	98
99.	THEORY OF THE SUBJECT	99
100.	THEORY OF THE SUBJECT	100





## TABLE OF CONTENTS

CHAPTER		PAGE
I.	<u>THEORY OF WAGES.</u> - - - - -	1
	Cost of subsistence theory - Specific productivity theory - Wage fund theory - Residual claimant theory - Bargaining theory.	
II.	<u>ELEMENTS IN A WAGE.</u> - - - - -	6
	What constitutes the day's work - Dependent factors for the price paid - Factors independent of the particular job.	
III.	<u>METHODS OF WAGE PAYMENT.</u> - - - - -	10
	Time or day rate - Straight piece rate plan - Piece rate plan with guaranteed day rate - Relation of unit and total costs to percentage of normal production.	
IV.	<u>THE INCENTIVE PLAN OF WAGE PAYMENT.</u> - - - - -	18
	Essential principles of a suitable plan - Job standardization - Interests of employer and employee - Inspection department for quality control - Principles to be observed in adopting an incentive plan.	
V.	<u>THE BEDAUX "POINT SYSTEM" OF WAGE PAYMENT.</u> - - - - -	24
	Demand for common unit of measure - Measurement of physical effort - The "point" defined - Rest factors - Phases of the "point system" - Possibility of application - The "point hour" as an index of performance.	

Page	Chapter
1	I. INTRODUCTION
	Cost of production theory - General productivity
	Theory - Long run theory - Technical efficiency theory -
	Long-run theory
7	II. MEASURING THE COST
	What constitutes the cost? - Dependent factors
	The two price rule - Relative importance of the two
	Relative cost
10	III. MEASURING THE COST
	Cost as a function of output - All other things being equal - How
	Costs are affected by technology - Location of costs
	and total cost as a function of output
15	IV. THE ECONOMIC THEORY OF COST
	Economic significance of a cost curve - How
	relationships - Relationship of output and cost
	Relationship between cost and output - How
	to be observed in relation to economic theory
20	V. THE ECONOMIC THEORY OF COST
	Costs as a function of output - Relationship of
	output and cost - The output effect - How
	Costs as a function of output - Relationship of
	costs - The relationship of output and cost



VI. PRELIMINARY WORK BEFORE ACTUAL APPLICATION. - - - - - 29

Analysis of plant operations - Classification by groups according to skill - Creating favorable impression with personnel - Basis for group designation of operations - Assigning of base rates - Selecting a starting department.

VII. DETERMINATION OF STANDARDS. - - - - - 35

Basic principle of the point system - Measurement of effort - Proper attitude of operators - Taking of time studies - Determination of normal times - Normal rate of effort - Necessity for correct method before setting standards - Compensating effect of rating - Characteristics of good time study men - Types of elements - Types of studies - Building tables - Permanency of standards - Specimen time studies.

VIII. APPLYING A DEPARTMENT. - - - - - 45

Notifying foreman and operators - Maintenance of guaranteed rates for period of adaptation - Starting point hour - Points to be made clear to operator - Early stages of the application - Transition to incentive plan of payment.





CHAPTER		PAGE
IX.	<u>RECORDING PERFORMANCE OF OPERATORS.</u> - - - - -	50
	Checking - Time card forms - Method of checking - Use of standards - Use of checking cards - Standard instructions for checkers - Reoperation forms - Lost reports - Complaint slips - Use of base rates.	
X.	<u>THE POSTING SHEET.</u> - - - - -	67
	Information on posting sheet - Time and frequency of posting sheet in the department - Use of posting sheet - Advantages - Conditions indicated by posting sheet.	
XI.	<u>PAYROLL AND ACCOUNTING PROCEDURE.</u> - - - - -	71
	Use of checking cards - Accuracy of information - Typical time card - Information on time card - Figura- tion of time card - Premium determination - Relationship of normal day wage to percent of normal production - Listing information on posting sheet - Listing of cards by rates - Use of work sheet - Daily analysis - Use of posting sheet for payroll - Supervision premium calcu- lation.	
XII.	<u>STANDARD INDIRECT COSTS.</u> - - - - -	81
	Determination of indirect ratios - Use of time study - Use of judgment - Record of past performance - Reasons for unbalanced indirect ratios.	





CHAPTER		PAGE
XIII.	<u>THE ANALYSIS SHEET.</u> - - - - -	87
	Time values - Corresponding money values - Purpose of analysis sheet - Calculation of items on the sheet - Use of the sheet for control purposes.	
XIV.	<u>THE "POINT" AS A CONTROL UNIT.</u> - - - - -	104
	Use of "point system" for control purposes - Main- taining satisfactory "point" hours - Graphical analysis of a department for period after application - Trend of "point" hours - Trend of labor costs - The "point" in production control - The "point" in methods work - The "point" as a basis for standard costs - The "point" as a statistical unit - The "point" in comparing payroll and production.	
XV.	<u>SUMMARY.</u> - - - - -	117
	The "point system" as a measure of the effectiveness of labor - Possible field of application - Development of ratios - Advantages of the "point" as a common unit of measure - Use of measuring devices in management - Necessity of good, able management along with the "point" system.	
	BIBLIOGRAPHY - - - - -	121
	ACKNOWLEDGMENTS - - - - -	123





## CHAPTER I

### THEORY OF WAGES





## THEORY OF WAGES \*

A number of theories of wages have been held by economists, none of them universally accepted, some clearly disproven by experience and now discarded. They disclose, however, limits between which wages must lie and indicate some of the forces effecting variation in wage levels.

### Cost of Subsistence Theory.

The oldest is the cost of subsistence theory, which held that the wage level is determined by the cost of maintaining the working force at a point of bare subsistence, that is, just enough to keep laborers alive. According to this theory, if wages fall below this level workers will begin to die off, and competition of employers for the decreasing supply of labor will force wages back to the subsistence level. On the other hand, higher wages in any given industry swells the supply of labor, and competition between workers as well as the steady increase in laboring population always tends to bring wages down to that level.

This theory was formed during the worst period of the Industrial Revolution, when the condition of the English laboring classes might well have justified it. It is no longer accepted. It ignores labor unions, productivity, and the fact that labor has a demand price as well as a supply price. It does, however, show clearly the level below which wages cannot go and remain.

### Specific Productivity Theory.

The specific productivity theory has been widely accepted in the

(\* Management Handbook, Sixth Printing - Section 16.)





United States, and, although it may fail as a full explanation of the phenomena of wages, it does show clearly the upper limit. According to this theory the price of labor is determined by its final utility, that is, the service which the worker renders to the enterprise. Labor, like capital, tends to get what it produces. Employers will compete for labor so long as they can just make a profit on its output. Wages are paid out of that output and cannot permanently remain above the point where profit ceases. If wages are above this point, the employer will cease to employ or must ultimately fail. This sets a definite upper limit to wages. This theory assumes the absolute freedom of competition and the ability to measure the exact value of labor. This measurement is possible only in a few of the very best managed plants and certainly is not made throughout industry at large.

#### Wage Fund Theory.

The wage fund theory holds that the wage level depends on the ratio of number of laborers to capital expended in purchase of labor, that is, to supply and demand. This is largely true but it ignores the utility and influence of labor unions, and fails to account for the difference in wage levels between different trades. Wages are not paid from capital fund but from production.

#### Residual Claimant Theory.

The residual claimant theory states that taxes, rent, interest, and profits are determined by definite economic laws and that the wage-earner is a residual claimant for what is left after these have been satisfied. There seems little justification for this view, as labor usually receives its share long before the product is disposed







of, and before the other shares have been paid. Actually, the enterpriser's or proprietor's share is more truly residual.

### Bargaining Theory.

In the bargaining theory, employers and employees are considered fairly equal bargainers in the open market. Wages are determined by the estimate each party sets on what it has to give and what it wants, and by its bargaining strength. This takes into account the standard of comfort, effect of labor combinations, etc. and is practical, but it assumes equality of bargaining power and does not explain the fairly definite wage levels in unorganized industries. Furthermore, it leaves out the third bargainer, the public. For a specific improvement in production the gain might go wholly to the employer in increased profits, wholly to labor in increased wages, or wholly to the public in cheaper goods. Usually it is ultimately divided between the three in proportions determined by their relative bargaining positions, which may vary greatly.

There are other theories, but those given have had widest acceptance. They may be summarized as follows:

1. Wages are paid out of production.
2. Wages are the result of a three-cornered competition between capital, labor, and the public.
3. The relative strength of these three parties is based mainly upon law of supply and demand, and upon bargaining power.
4. The wage level cannot permanently exceed the produc-





tivity of labor, nor be permanently below the minimum requirements of the standard of living of the group concerned.

5. Between these levels, the wages of any given group will depend upon various factors among which are:

- (a) Supply and demand of labor.
- (b) Amount of profit, and competitive conditions in the industry.
- (c) Organizations and relative bargaining power of employers and workers.
- (d) Productivity of labor.
- (e) Cost of living, and the purchasing power of money.
- (f) Competitive wages in the same community and industry.
- (g) Mobility of labor.
- (h) Knowledge of the labor market.
- (i) Custom.
- (j) Availability of machinery or processes to replace.





## CHAPTER II

### ELEMENTS IN A WAGE

CHARTER

1877



## ELEMENTS IN A WAGE

There are two distinct elements in the wage problem:

1. What constitutes the day's work.
2. Dependent factors for the price paid.

### What Constitutes the Day's Work.

This involves time and motion study, job analysis, and job standardization. It has various names. It is the clear determination of what is being bought and sold without reference to price paid. It should define quantity and quality of work that the employee should render and conditions, equipment, and materials that the employer should supply. It corresponds to a deed in a real estate transfer, which may or may not give the price paid but does define what is being transferred.

### Dependent Factors for the Price Paid.

This may be by day work, piece work, or one of the modern incentive plans. It contains a number of factors some of which are characteristic of the particular job, others are wholly independent of it.

Following are some factors characteristic of the particular job:

- (a) Physical effort required, deftness, temperament.
- (b) Personal skill necessary, independent of training.
- (c) Hazards involved, if any.
- (d) Strain due to speed, noise, attention, discipline, etc.
- (e) Disagreeableness of job.
- (f) Possibilities of advancement.
- (g) General education required.





- (h) Special job instruction and training.
- (i) Experience and length of service.
- (j) Steadiness of job, seasonability, etc.

Intermediate factor:

- (m) Labor supply - for the particular job and in general.

Factors independent of the particular job:

- (w) Cost of living.
- (x) Wages in community.
- (y) Wages in industry.
- (z) Financial situation of the industry, whether product is in demand, whether profitable or sharply competitive.

As it is unsafe to set an individual wage rate without adequate knowledge of current wage rates in the community, so it is unsafe to set a wage rate for a specific type of work in an establishment without taking into consideration rates paid in the same establishment for all other kinds of work which will be brought into comparison with it, in the minds of employees. It is necessary to bring various rates together for comparison with each other and for consideration in the light of various factors which pertain to the wage-setting process. As a result of such comparison, rates should be equalized, but equalization does not mean that rates should be identical. What should be equalized are ratios between remuneration and difficulties of tasks. A base rate may be defined as that time or piece rate which is accepted by both employer and employee for a given class of work, at a certain time and in a certain locality.





Wherever a system of wage rates has come into existence as the result of a series of disconnected acts of the establishment, or has long stood unrevised through force of custom, there are certain to be some jobs which are considered by the working force to be overpaid and others deemed to be underpaid. In such an establishment there will always lurk the suspicion that holders of overpaid jobs are favorites. Existence of such jobs will be a constant source of jealousy and resentment and is destructive to plant morale. With underpaid jobs, on the other hand, management will have constant trouble. The type of person accepting such work will be unsatisfactory, and will be dissatisfied and fertile in complaints and grievances. Quality of work will be poor and turnover of labor will be unusually high.

Statistics of turnover of a department over a year's time may indicate where adjustment in wage rates should be made, but on such a vital matter more immediate and prompt information is required, so that a direct and close study of the employee's attitude should be carried out.

As will be pointed out in the later discussion on the preliminary work before actual application of a modern incentive plan, it is of paramount importance that the base rates set up for the various factory operations are in line with the proportionate skill required for their execution.





### CHAPTER III

#### METHODS OF WAGE PAYMENT





## METHODS OF WAGE PAYMENT \*

There are three outstanding methods of wage payment in use in industry today. These are straight day work, piece work, and the many forms of modern incentive plans. Employers are not limited in their choice of wage payment plans today because the plans are of such great variety that they cover almost any combination of conditions.

### Time or Day Rate Plan.

Time or day rate is the commonest and simplest of all methods of wage payment. By itself it has no relation to task principle as it offers the workman a given sum for a fixed period of his time. The rate may be quoted as so much per hour, day, or week. The limits of a given rate are, at bottom, the point of inefficiency which brings discharge, and at top, the limit of excellence which may or may not be rewarded by promotion. Within these limits, day rate pays exclusively for the workman's time, taking no account of quality or quantity of work done.

Any increased productive effort which the employer is able to secure from his force by means of careful selection of individuals, division of labor, introduction of machinery, or by proper supervision is clear gain to him. Wherever, and so long as work is difficult to standardize and to put on a task basis, a form of time system will be utilized. Repair work, for instance, which is not repetitive is commonly paid for in this way. Without assistance of other devices and close supervision, time payment may permit the worst kind of inefficiency.

(\* "Wage Payment Methods" by National Metal Trades Association Report of Research Committee.)

There are two main subjects of the future of the nation. The first is the future of the nation as a whole, and the second is the future of the nation as a part of the world. The first subject is the future of the nation as a whole, and the second is the future of the nation as a part of the world.

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From experience it has been discovered that the average day worker takes a great deal longer time to do his work than is really necessary without overexertion. That part of his time which is lost has been found to be divided into:

(a) Waiting time - which is beyond workers' control.

(b) Slowness - which worker should be able to correct.

Waiting time, for which supervision is largely responsible, is minimized through supervision incentives. Such lost time is due to breakdowns of equipment, no material, or no orders for the worker to work on.

Slowness, expressed in inaptitude, inexperience, loafing, and soldiering of workers is largely due to the state of mind of the operator. This laxity may also occur when time payment is used as a productive guaranty up to task amount of production, or as used to protect the worker during times of emergency. The latter situation is often necessary and the former is considered desirable by many.

There are several measures which can be utilized to connect time wage with task: (1) Time which elapses on a good job can be carefully recorded and checked up together with conditions of performance. (2) Production records can be kept and followed by individuals and foremen. If these two steps are taken and if adjustments in rate are made according to performances, time plan can be fully as successful as many of the more complex wage plans. While it is, therefore, decidedly undesirable by itself, it can be very successful when properly supported and supervised.





As is evident from the graph for the day work plan of wage payment, the cost per piece is high at lower productions and apparently low at higher productions, but as a matter of fact, higher productions are seldom obtained under this system, so that the total cost per piece should be considered high unless adequate supervision is successful to obtain higher efficiencies.

Under the straight time method of wage payment the total earnings are equal to the product of the hours worked and the hourly rate. Wages paid under this plan bear no direct relationship to the amount of work produced. Production volume is maintained by supervision only. As a general rule, it may be said that the only relationship between the hourly rate and the production volume is the risk of discharge at low production and the chance for promotion at high production.

The advantages of this method of wage payment are:

1. Utmost simplicity.
2. Applicable to all kinds of jobs.
3. Permits a high degree of quality in production.

The disadvantages of this method are:

1. Permits excessive idleness.
2. Requires intense supervision for effective production.
3. Does not stimulate high rate of production.

#### Piece Rate Plan.

Ordinary piece work is the oldest and perhaps the simplest of the incentive plans of wage payment. Under this plan the employee is

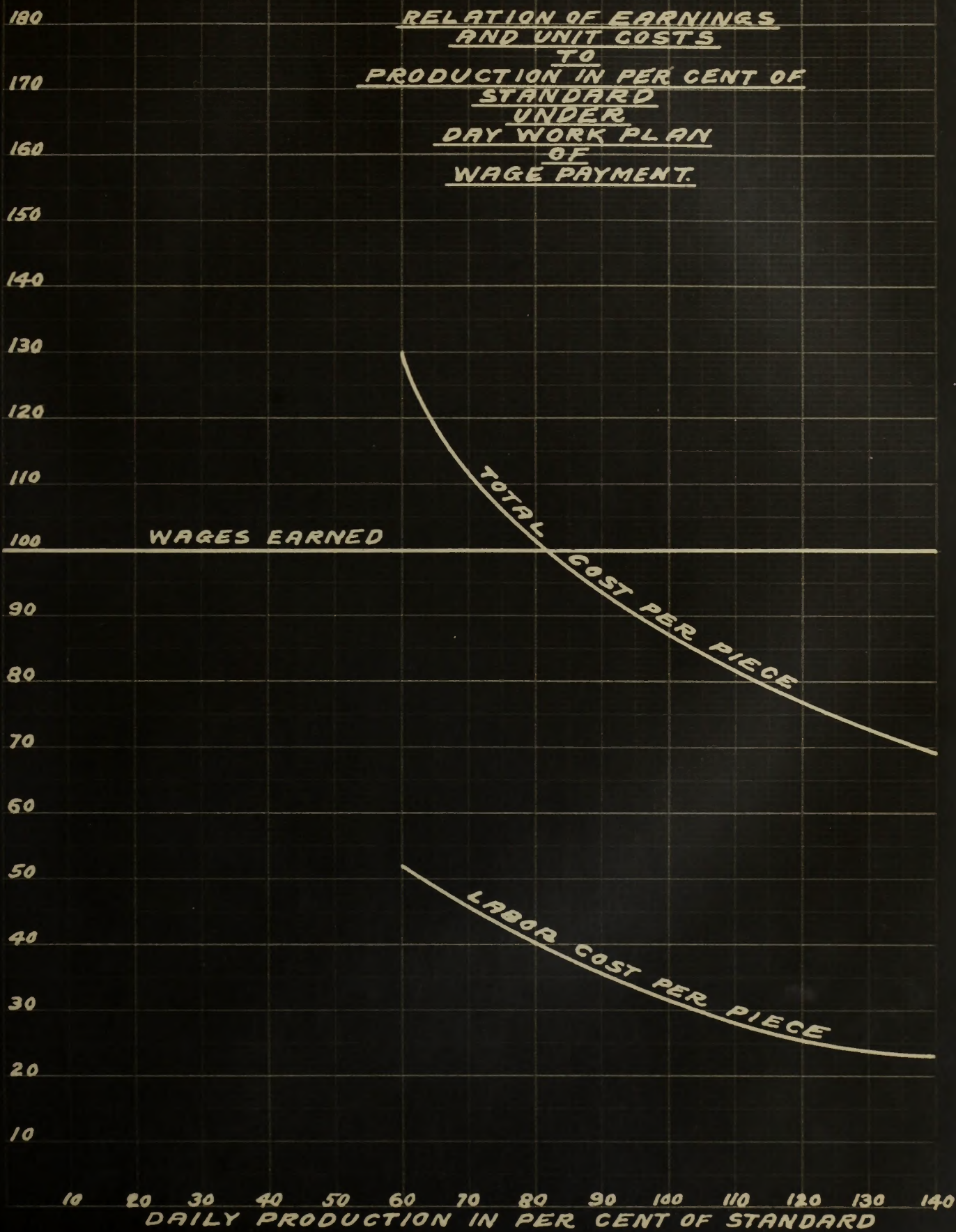


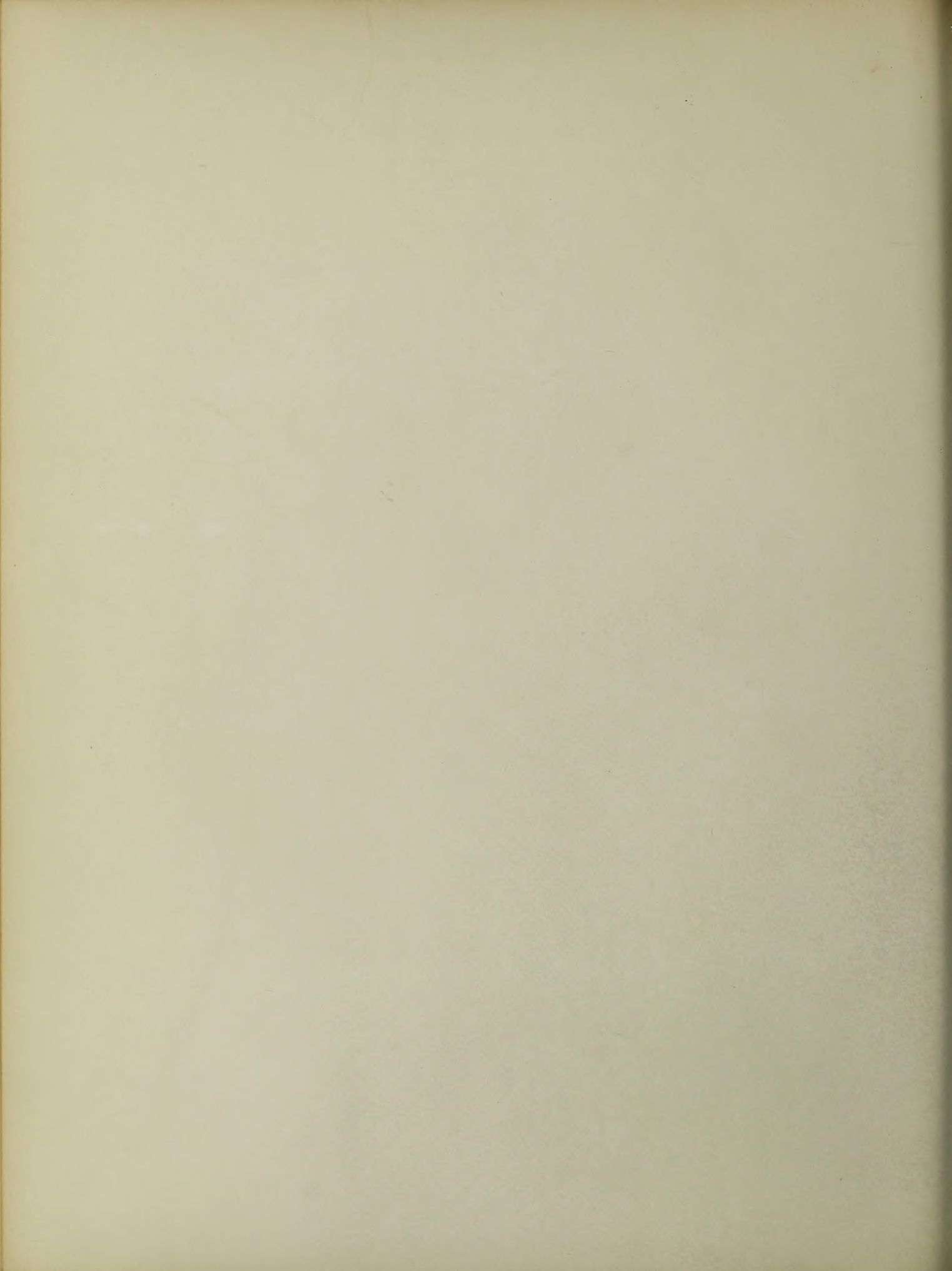




RELATION OF EARNINGS  
AND UNIT COSTS  
TO  
PRODUCTION IN PER CENT OF  
STANDARD  
UNDER  
DAY WORK PLAN  
OF  
WAGE PAYMENT.

DAILY WAGE IN PER CENT OF BASE







paid for work performed instead of time spent, a certain price being paid for each piece produced. The workman benefits directly from all time saved and suffers from all time lost.

Piece rate is that method of payment in which the worker is paid a constant rate per unit produced. This is not a one-sided bargain like time payment, but may be nearly as inefficient if either time or rate is carelessly set. Piece rates are sounder in principle than time rates and fully as simple to understand. Wages per day are not guaranteed and the worker's earnings will depend mainly upon his own effort.

The piece rate is discouraging to a beginner, but furnishes an opportunity for every ambitious and capable worker to raise himself to a high wage per day. So important is this latter feature that any interference on the part of the employer with an established rate destroys the whole merit of the plan. Wherever an employer has a definite limit for maximum wage per day, and has cut piece rates to keep wages within this limit, employees quickly discover that limit and systematically keep production below that point. Piece rates, so abused, are no better than day rates.

The graph for the piece work plan of wage payment shows that the cost per piece is constant as far as direct labor is concerned and that the total cost per piece is more nearly constant than for any other plan. Total costs are higher than time costs for high productions but higher productions are rarely reached under the time or day work plan.

The advantages of the ordinary piece work plan are:



and the work of the committee is to be done in a way that will be of benefit to the community. The committee is to be composed of representatives of the various groups and individuals who are interested in the work of the committee.

It is the duty of the committee to see that the work of the committee is done in a way that will be of benefit to the community. The committee is to be composed of representatives of the various groups and individuals who are interested in the work of the committee.

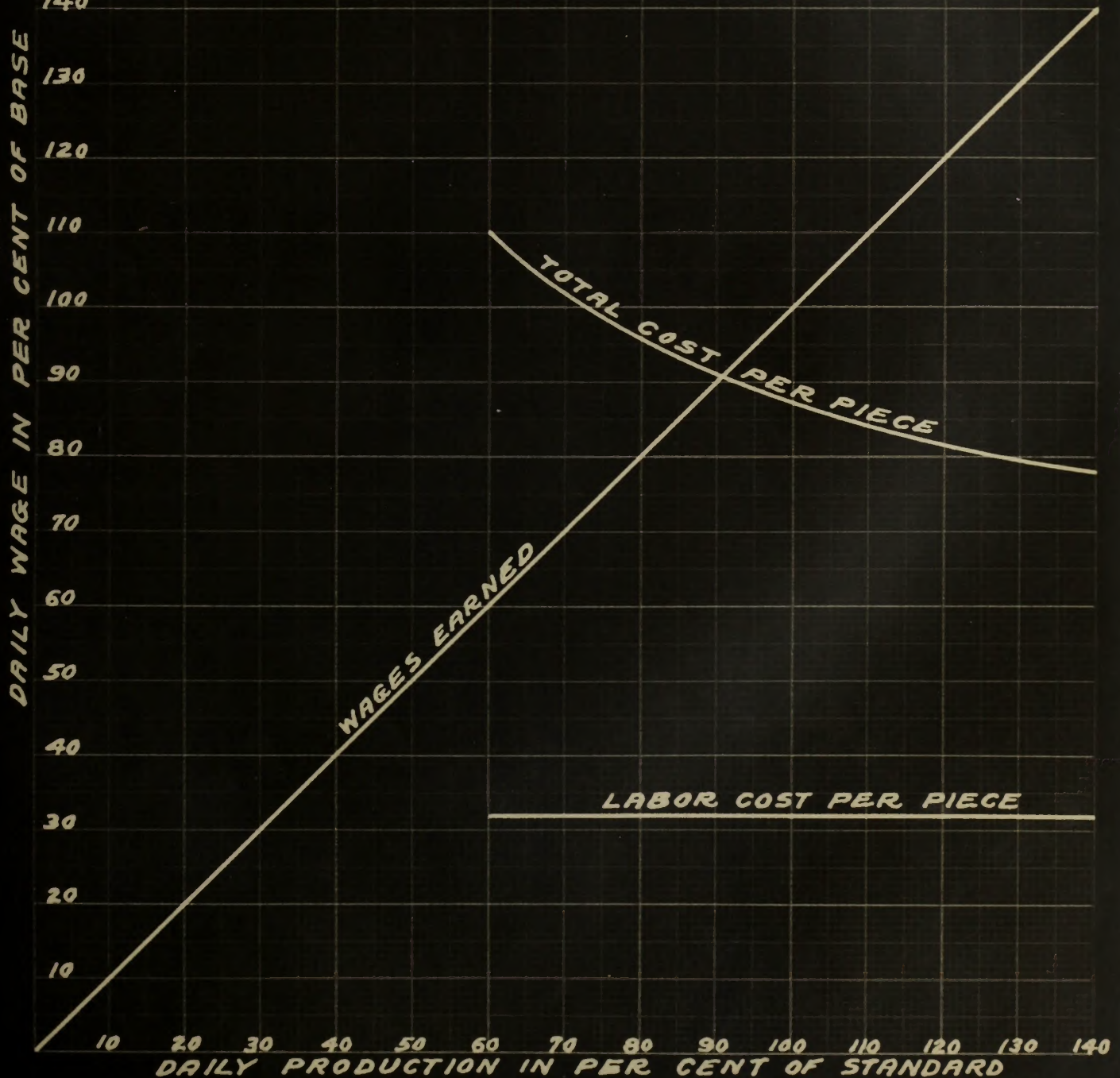
The committee is to be composed of representatives of the various groups and individuals who are interested in the work of the committee. It is the duty of the committee to see that the work of the committee is done in a way that will be of benefit to the community.

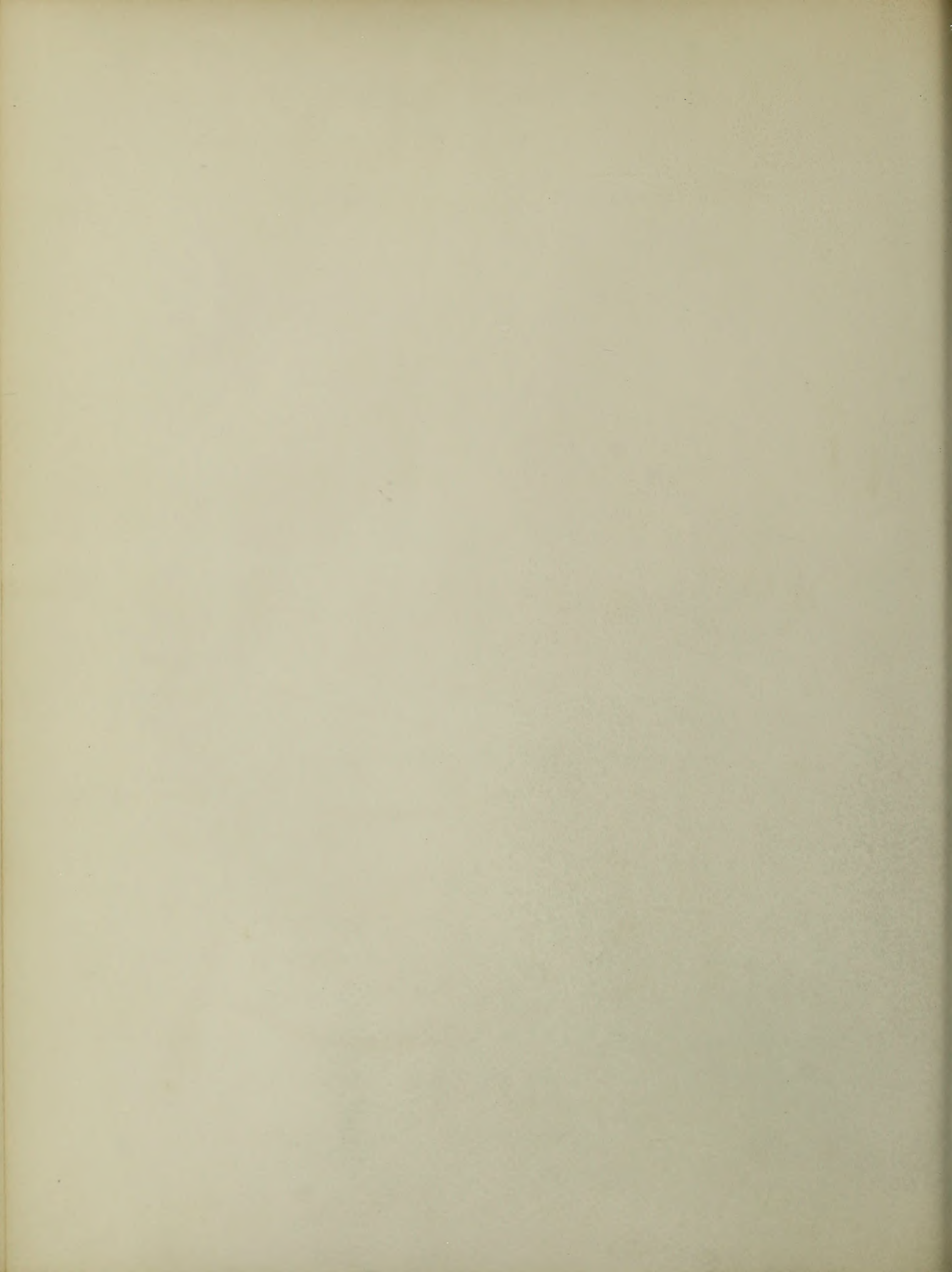
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The committee is to be composed of representatives of the various groups and individuals who are interested in the work of the committee.



RELATION OF EARNINGS  
AND UNIT COSTS  
TO  
PRODUCTION IN PER CENT OF  
STANDARD  
UNDER  
PIECE RATE PLAN  
OF  
WAGE PAYMENT







1. Workers being paid in direct ratio to their productive effort, it is fairest to both employee and management.
2. Stimulates production of all workers, thus lowering total unit costs.
3. Offers high reward to workers of superior ability.
4. Easily understood by employees.
5. Very easy to install and administer.
6. Requires low supervisory costs.

The disadvantages are:

1. Discouraging to beginners.
2. Does not protect workers against loss of earning power due to causes beyond their control.
3. Tends to sacrifice quality for quantity.
4. Rates difficult to establish.

Due to the fact that ordinary piece work is discouraging to a beginner most plans of this particular type are modified so that they carry a guaranteed hourly or day rate and give the beginner a guaranteed minimum wage while he is learning. This guaranteed rate will affect new men usually because it is set at a point which can be readily exceeded when the man becomes more skilled on the job.

This plan has the further advantage of protecting the employees





against stoppage of machinery or from any managerial or plant emergencies which might interrupt the flow of material or otherwise interfere with the workmen's usual rate of production. These conditions are the responsibility of management and beyond the workman's control and he should not be penalized for their occurrence.

The advantages of the piece work plan with guaranteed day rate are:

1. Encouraging to beginners, yet retains the high incentive for fast workers.
2. Protects workers against losses due to an inefficiency of management.
3. Easily understood, easily installed, and easily administered.

The disadvantages are:

1. Tends to slow down workers of mediocre ability.
2. Requires slightly more clerical labor than the ordinary piece rate.

The plot on the next page gives a graphical representation of the three wage plans discussed in the chapter. The abscissa represents the percentage of normal production per day and the ordinate the percentage of normal day wage.

It is apparent from the curve for payment under the day work plan that the earnings are constant regardless of production.

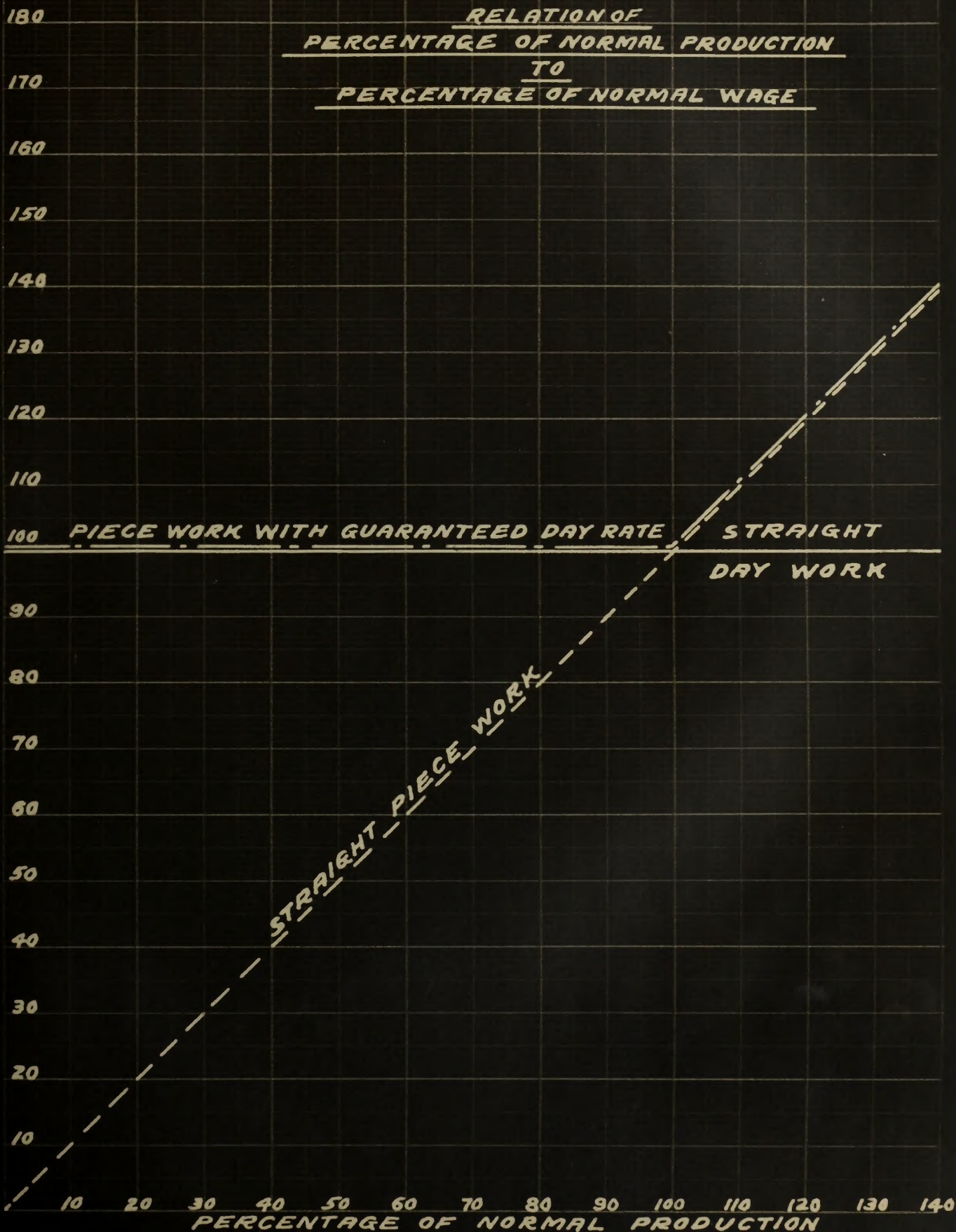


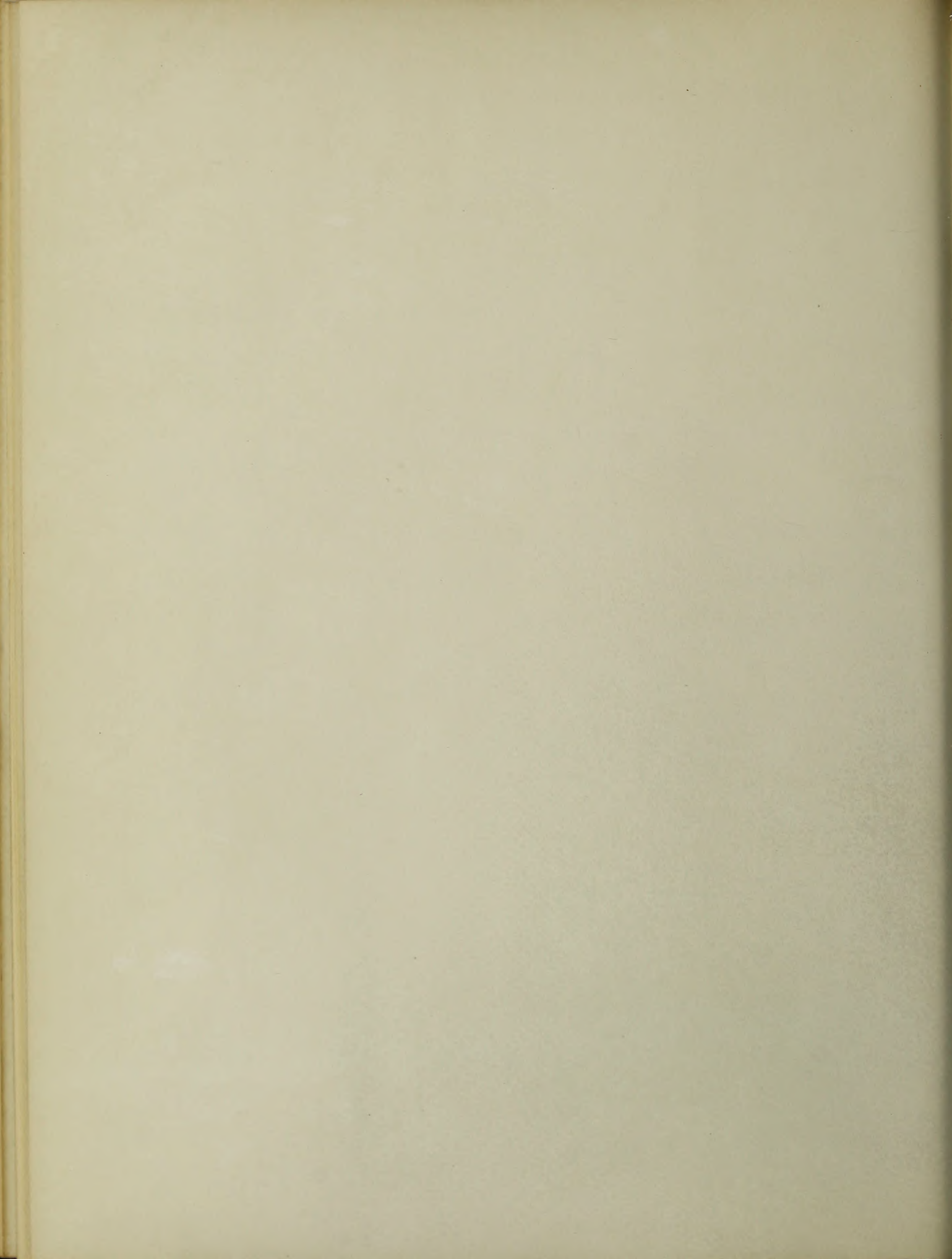




RELATION OF  
PERCENTAGE OF NORMAL PRODUCTION  
TO  
PERCENTAGE OF NORMAL WAGE

PERCENTAGE OF NORMAL DAY WAGE







Under the straight piece work method the earnings are a straight line variation or in direct proportion to the percentage of normal production. The slope of this curve is defined, of course, by the intersection of the ordinate for one hundred percent production and the abscissa for one hundred percent of normal day wage.

With the modified piece rate plan the curve indicates a constant earning regardless of production up to the point of one hundred percent of normal production. From this point on the earning curve has the same slope as the straight piece work plan.

This chapter gives the basic principles underlying the operation of the plans discussed. All of these plans have modifications depending upon the nature and peculiar circumstances attending the particular application under consideration.

Under the right hand and under the left hand the  
line variation is in direct proportion to the variation of normal pro-  
duction. The slope of this curve is a function of the nature of the inter-  
action of the different factors and is not constant. It is  
characteristic for each physical process of normal variation.

With the addition of these two curves the curve of normal  
variation is obtained. It is the sum of the two curves and is  
characteristic of normal production. From this point on the curve of normal  
variation is the same as the curve of normal variation.

This chapter gives the results of the investigation of the  
of the plane diagram. All of these results have been verified by  
the use of the method of least squares. The results of the investigation  
application under consideration.



## CHAPTER IV

### THE INCENTIVE PLAN OF WAGE PAYMENT

VI 1917-1920

THE IMPERIALIST

OF THE



## THE INCENTIVE PLAN OF WAGE PAYMENT

A wage incentive plan is no panacea for industrial ills nor is it a direct cure for existing defects. It is a device for making permanent methods and standards of work developed through analysis. The essential principles of a suitable plan are:

1. An incentive plan should have as its fundamental purpose increasing the value of employees' service both to themselves and their employer.
2. Such a plan should serve to promote confidence and understanding between employer and employees.
3. To that end, benefits to employees should be substantial and in addition to current rate of wages.
4. Participants in the plan should be informed as to the factors affecting payment and the amount of incentive. The period over which performance is figured should be short, usually a day.
5. The success of any plan is particularly dependent upon effectiveness of its management. Any plan, no matter how admirable may be its features, will fail unless it is properly managed.

Nothing should be done until the job is thoroughly standardized according to best devisable methods. This done, it is analyzed to





determine just what object is to be attained and the relative importance of quantity, quality, and material saving decided upon. In some cases it will be found that quantity produced is beyond the control of the operator, as for example, a machine tender whose job is to watch an automatic machine to see that the product is uniform and according to predetermined standards. In such a case allowable variations from exact standard of quality are prescribed and incentives for keeping within those limits established. Again, where the value of material used is high in comparison with the labor involved, this becomes the most important factor and accomplishments in this direction should be stimulated. An illustration is that of cutting expensive leather for shoes. Many jobs will involve all three factors.

In every case, the underlying principle is to determine the interests of management in the performance of each operation and then to set rates so that interests of operative will coincide exactly with those of the management.

The incentive must be set in such a way that the employer's and worker's interests coincide. Moreover, in putting a job on an incentive basis, it is essential that quality be thoroughly safeguarded before any quantity bonus can be earned. In other words, maintenance of quality standard must be made absolutely prerequisite to any quantity bonus whatever.

A well developed inspection department can protect the quality of the product sufficiently in the majority of cases, but there are some industries in which it is necessary to emphasize the importance of quality above all other considerations.





It is obvious that to be of maximum benefit to employee and employer alike, the incentive plan of wage payment used should meet exactly the individual requirements of the individual shop. The problems of returning to the employee a maximum wage and to the employer a minimum net unit cost of product, coupled with individual plant circumstances such as the volume of production, the variety of product, the usual quantities in lots, the frequency of changes, the desirability of an accurate cost accounting system, or a flexible production control system, all tend to make the selection of a proper incentive plan an important consideration.

The following rules and principles should be observed in the adoption of an incentive plan:

1. The work in question should be studied in detail and definite methods of operation adopted. The process of determining the best way to perform the operation may be called methods engineering, time study, motion study, job standardization, or motion-time analysis; but whatever means is used, the best way to do the job should be carefully and completely determined before anything else is attempted.
2. Rates or standards should be established only as a result of a series of accurate studies, and should be subject to such checks and rechecks before definite adoption as to make unnecessary any later change in the rate or standard as long as the job itself remains unchanged.





3. A definite task, bogey or other measure of what constitutes a day's or a week's work should be established so that the performance of individuals, groups, or departments may be readily measured and compared.

4. Employees should be protected against the possibility of reduced earning power due to circumstances beyond their control. This refers to the inefficiency of management as exemplified in an interruption of the flow of materials, a shortage of proper tools or equipment, the breakdown of machinery, or an inadequate power supply. This is generally accomplished by the use of a guaranteed minimum time wage or hourly rate.

5. The wage incentive used should be sufficiently flexible to permit application to the maximum number of jobs and the maximum number of employees.

6. The wage payment plan for indirect labor and supervision should be such as to harmonize with the incentive plan used for direct labor, so that there will be no conflicting interests between the different groups of employees. For instance, the pay of inspectors should not be based upon the number of defective pieces found, as a feeling of mistrust between the respective groups of employees involved will be developed, whether justified or not. Neither should departmental foreman be paid an incentive to keep the indirect labor ratio down when it may be possible that an increase in indirect labor might be more than off-





set by a consequent increase in total departmental production.

7. Whatever plan of wage payment is used, it is most important that the plan itself be simple enough to be readily understood by all employees. The employee should not only be able to compute his earnings independently of the payroll department, but should be able to readily relate such earnings to his individual productive effort. The most patient efforts are necessary to insure that all employees fully grasp the methods by which their pay is computed, for if they do not fully understand there is a fertile field for gossip and misunderstanding.

8. Under all circumstances and under all conditions the plan or plans of wage payment should not only be fair and just to employee and management alike, but should scrupulously avoid any appearance or even suggestion of unfairness in any sense whatsoever.





## CHAPTER V

### THE BEDAUX "POINT SYSTEM" OF WAGE PAYMENT





## THE BEDAUX "POINT SYSTEM" OF WAGE PAYMENT

There has always been a demand in industry for some common unit of measure for the physical effort expended by labor in performing its tasks.

A few years ago Charles E. Bedaux formulated a principle for the measurement of physical effort. This principle was incorporated in a plan which has since become known as the "Bedaux System" and sometimes referred to as the "Point System". It is called the "Point System" because the "point" is the common unit of measure. In some applications this common unit is called the "B". Throughout this thesis the plan will be referred to as the "Point System".

The "point" or "B" is equal to a fraction of a minute of work plus a fraction of a minute of compensating relaxation, the sum of these two equalling unity or one "point". The proportion of work and the relaxation or rest factor will vary according to the particular task under consideration. Tasks that require frequent repetitive motions will necessarily carry a different rest factor than those which require a comparatively long cycle for their completion. These rest factors are set up by an analysis of the fatigue entering the various tasks.

The "Point System" furnishes management with a measuring stick by which it can control a large number of factors entering into the effective administration of the company labor supply.





The system divides itself logically into three distinct phases:

1. Setting of standards - the actual time study work.
2. Payment of operators - checking of production.
3. Departmental analysis and compensating of supervision.

A detailed consideration of these three elements will be given in later chapters.

The plan can be applied to an industry regardless of the particular type and the resultant benefits derived. With the "point" as the basis for comparison it is possible to compare the effectiveness of labor in a plant manufacturing saws with a woodworking plant manufacturing chairs or a textile mill manufacturing cloth. It is true, of course, that the most desirable applications will be in industries in which repetitive processes are common. Due to modern methods of mass production in nearly all industries the possibilities of application are extensive.

Applications have been successfully made in the following industries:

1. Electrical equipment.
2. Optical supplies.
3. Safety razor and blade manufacture.
4. Rubber shoe and tire industry.
5. Saw and knife business.
6. Textiles - both cotton and woolen.
7. Sewing machine business.
8. Canning industry.





9. Furniture industry.
10. Photographic supplies.

Some of the outstanding organizations having Bedaux applications are:

1. Gillette Safety Razor Company
2. Hood Rubber Company
3. General Electric Company
4. White Sewing Machine Company
5. American Optical Company
6. Campbell Soup Company
7. Eastman Kodak Company

The measure of performance of the direct labor is the rate of the "point" earning. For any given operator this is known as the operator's "point hour" and for any given day is equal to the quotient of the total "points" earned during the day and the number of hours in which they were earned. To the operator the "point system" is a task and bonus plan. For all time spent on the job he is paid a guaranteed rate consistent with the particular operation he is performing. Every operator is expected to produce at a 60 "point hour" rate. This rate of effort is called a normal "point hour" and is the rate at which a normal operator would work to perform the operation in normal time.

The operator's "point hour" is figured daily and is a daily measure of the performance of the operators in the entire plant. The "point hour" reduces the showing of all operators to a common denominator and makes possible the determination of the rate of effort of all

Some of the ...

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"point ..."  
and makes possible the ...



operators in the plant.

Knowing the individual operator's "point hour" a basis is provided for the locating of men on work on which they are most effective and almost makes possible the elimination of low producers or shifting them to jobs for which they are better adapted.

From the individual "point hours" in any given department a departmental "point hour" can be arrived at which is a measure of the whole department. This department "point hour" is equal to the quotient of the total "points" produced in the department and the total hours in which they were produced. For example, if a department of 25 productive operators produces 100,000 "points" in any one week of 50 hours the department "point hour" is said to be an 80.

With the various department "point hours" to use as an index of performance it is possible to compare various departments throughout the plant. Such comparative showings may lead to investigation of the lower "point hours" with the resultant possibility of correctives being applied to increase the department "point hour". This may mean the necessity of making either one or all three of the following changes:

1. Increasing the "point hour" of the present operators.
2. Shifting or replacing some of the present operators.
3. Making supervision more effective.

There are many other uses to which the common measure, the "point" can be put, some of which will be discussed in a later section.

Showing the individual operator's "point" is not  
 valid for the purpose of use as a basis for the selection  
 and almost makes possible the elimination of the operator as well  
 as to take for what they are better equipped.

From the individual "point" shown in the above mentioned a de-  
 termined "point" can be derived as shown in a number of the  
 whole department. This department "point" is used in the de-  
 part of the "point" provided in the department and the "point"  
 hours in which they are worked. The standard is a department of  
 the productive operator's "point" 100,000 "point" in one year at  
 50 hours the department "point" is said to be at 50.

With the various department "point" shown in the above table of  
 performance it is possible to compare with the department's  
 the point. But comparative methods are used in investigation of the  
 lower "point" shown with the method provided by comparative in-  
 the applied to determine the department "point" shown. This point  
 the necessity of which shown one of the three of the following

Diagram:

1. Determining the "point" shown of the present operator.
2. Determining or establishing one of the present operators.
3. Making comparison with others.

There are very many ways to select the operator shown, the  
 "point" can be put, none of which will be discussed in a later section.



## CHAPTER VI

### PRELIMINARY WORK BEFORE ACTUAL APPLICATION





## PRELIMINARY WORK BEFORE ACTUAL APPLICATION

The real tangible work in an application of the "point system" begins with the actual taking of time studies for the purpose of setting standards. Before this work can be started, however, a complete analysis must be made of all operations in the plant for the purpose of setting up skill classifications. An analysis is made of all plant operations and the comparable skill required for their performance. These operations are then classified into definite groups and a base rate set up for each group. The rate for each group is the base wage which the particular operation will carry.

This classification of skill and adoption of base rates is done by the management in conjunction with the staff of installing engineers.

A general inspection of the plant is made to get an idea of the plant layout, the products manufactured, type of equipment, and perhaps what is most important at this stage, the general attitude of the personnel. This plant inspection should preferably be done in cooperation with the plant executives who are intimate with the plant detail and policies. This preliminary inspection does not mean that the installing engineer will from then on be capable of handling all issues incident to the application, but it merely gives him a picture of the problem before him and enables him to lay his plans for the coming work.

It is of extreme importance at the early stages of the application to create the right impression with the departmental foremen.

The first meeting took place in the morning at 10 o'clock. It was held in the room of the late Mr. Williams, who had been the owner of the property. The room was on the second floor of the house, and was a small, square room, with a fireplace on the left wall. The room was in a state of disrepair, and the furniture was old and worn. The walls were covered with paper, and the floor was made of wooden planks. The room was very dark, and the only light came from a single window on the right wall. The window was small and had a wooden frame. The room was very quiet, and the only sound was the ticking of a clock on the wall.

This interview was a very short one, and was held in the room of the late Mr. Williams, who had been the owner of the property. The room was on the second floor of the house, and was a small, square room, with a fireplace on the left wall.

A second interview of the same kind took place in the afternoon. This interview was also very short, and was held in the same room. The room was on the second floor of the house, and was a small, square room, with a fireplace on the left wall. The room was in a state of disrepair, and the furniture was old and worn. The walls were covered with paper, and the floor was made of wooden planks. The room was very dark, and the only light came from a single window on the right wall. The window was small and had a wooden frame. The room was very quiet, and the only sound was the ticking of a clock on the wall.

It is of course impossible to say whether or not the interview was a success. The room was very dark, and the only light came from a single window on the right wall. The window was small and had a wooden frame. The room was very quiet, and the only sound was the ticking of a clock on the wall.



Their complete cooperation will be needed throughout the application and they should be made to feel that they are to play a vital part in the changes to come. The installing engineer should sell himself to the plant foremen so that they will have faith in what he is setting out to accomplish. If the foremen are in sympathy with the work they will transmit this sentiment to the men under them.

The psychological phase of this type of work is extremely important. The human element is concerned throughout the entire application and is perhaps the greatest variable which will have to be contended with. Upon the degree to which the human relationships are solved will depend, to a large extent, the success of the application.

A complete list of all factory operations is obtained either from the departmental foremen or from the plant cost division. It is advisable to use the former method because of the opportunity for personal contact with the foremen. This possibility of contact is most important because it is essential that harmonious relations exist between the installing engineer and his staff and the departmental supervisory people.

After the operations of each department have been listed they are rearranged in alphabetical order to facilitate comparison. It is also advisable at this point to compare these lists with the records of the cost division to determine any possible omissions.

With the lists of operations of all departments available it is possible to separate all the plant operations into definite groups. This analysis should be made with the assistance of the plant execu-





tives who are familiar with the various operations.

This classification is usually made into ten groups. The basis for the group designation of the operation is a consideration of the following three factors:

1. Skill required to perform the operation.
  - (a) length of time to learn the operation.
2. Whether the work is of a heavy or light nature.
3. Conditions under which the operation is performed.
  - (a) hot or cold surroundings.
  - (b) wet or dry.
  - (c) dust consideration.
  - (d) fumes.

The various groups are numbered from one to ten - group one being the operations that require the maximum skill for their performance and group ten the operations requiring the minimum amount of skill. There will be a great deal of discussion in selecting these groups because of the difference in opinion of the various operations. These lists are all studied and listed a second time for the purpose of detecting any inconsistencies in the analysis. As was mentioned before, it is of paramount importance that the plant executives work with the installing engineer in making this classification. He is only familiar with the plant in a general way while the executives and supervisory staff know the many details entering into the actual manufacture of the product.

These lists with the ten groupings now become the master base

shows the similarity with the various operations.

This classification is usually made into three parts.

For the first part of the operation the classification is as follows:

Following these three parts:

1. With regard to the nature of the operation.

(a) Nature of the operation.

2. Whether the operation is of a simple or complex nature.

3. Whether the operation is of a simple or complex nature.

(a) Nature of the operation.

(b) Nature of the operation.

(c) Nature of the operation.

(d) Nature of the operation.

The various operations are classified into three parts: (a) Nature of the operation.

(b) Nature of the operation.

(c) Nature of the operation.

(d) Nature of the operation.

(e) Nature of the operation.

(f) Nature of the operation.

(g) Nature of the operation.

(h) Nature of the operation.

(i) Nature of the operation.

(j) Nature of the operation.

(k) Nature of the operation.

(l) Nature of the operation.

(m) Nature of the operation.



rate lists for the entire plant and if the original analysis has been carefully and accurately done there will be very few changes necessary during the application. There may be instances, when the actual time study work is being done, that conditions indicate a wrong grouping for some of the operations. If such conditions are discovered the necessary corrections are made.

The actual monetary value of the base rates are set up after a study of local conditions and rates for similar types of work in the community. The prevailing rates for like classes of work may be entirely different in different communities due to such factors as the size of the city, mobility of labor, labor organization, etc. However, although the level of wages may be different the group skill relationship remains constant.

The base rates are usually set up in figures which make their mathematical relationship with the hour equal. This, of course, is to facilitate wage calculation and payroll procedure. The rates usually advance in increments of three cents per hour.

The grouping may be different in different plants because the analysis is a comparative one. No two plants will have the same manufacturing processes and therefore the relationships will differ.

With the skill classifications and corresponding base rates approved by the management the next step is the actual start of the time study work. A starting department should be selected where the foreman contact has been satisfactory and where the foreman is the type of man who will cooperate in bringing about any desirable changes in





the department.

The foreman of the department selected is called into consultation with the plant executives. A general explanation of the point system detail is given to him so that he will understand the object of the application and the method to be pursued in his department. The principles of time study should be explained to him so that he can prepare his men for the time study work about to begin. The foreman above all must be shown that his cooperation is necessary and that he must react favorably to the men when questioned by them. There will be changes made as the work goes on and the foreman should have these pointed out to him along with their resultant effect.

The purpose of the document is to provide a general  
with the same information. A general understanding of the subject  
detail is given to him so that he will understand the object of the  
application and the action to be taken in his department. The writer  
right of the law, should be explained to him so that he can protect  
himself for the time being and to be in. The intention of the  
must be made that the explanation is necessary and that he must not  
loosely to the law when questioned by them. There will be a chance  
call as the work goes on and the writer should be able to  
to him along with the subject of the law.



## CHAPTER VII

### DETERMINATION OF STANDARDS





## DETERMINATION OF STANDARDS

Standards are set up under the Bedaux System in "points". As defined in chapter five, a point consists of a fraction of a minute of work plus a fraction of a minute of compensating relaxation, the sum of these two factors always aggregating unity. A standard for any given operation is the allowed time for the operation expressed in points.

The basic principle of the point system is that the fundamental time required for performing any operation in a definite way is constant. The expenditure of effort for any given operation is the same regardless of whether the effort is expended over a long or short period of time. A fast operator uses energy at a fast rate, a slow operator at a slow rate, but the total energy required to perform the operation is the same in both cases provided that the operation is performed in the same way.

The point system measures the effort required to perform a given task and evaluates that effort in terms of points.

Standards are built up from time studies taken of the operations or by comparative data obtained by time study. The object of time study is to determine the standard time or the normal time in which a normal operator working with normal effort should perform the operation.

Before time study is attempted in the first department it is important to determine the attitude of the operators. Quite often





objections to being timed are encountered in the early stages of the application. These conditions should be straightened out as such sentiment may develop into more serious proportions. It is not especially difficult to convince an operator that he should be time studied when he understands the possibilities such procedure open up for him in the way of increased earnings. Much better results can be obtained if the operator is willingly timed rather than to force him to perform under observation.

In taking a time study the timer divides the complete operation on the piece being timed into its component elements. He also lists in detail the method of performing the operation and the conditions prevailing at the time of the study. This detailed description of the operation indicates exactly how the task was performed. The standard set up applies to the operation only as long as the operation is performed as it was originally time studied. When the method of performing the operation changes the original standard no longer applies and a new value must be set up.

By the use of the stop watch, successive readings are taken on every element until the timer is satisfied that he has sufficient data and information upon which to base a standard. These readings are taken and plotted with the object of determining the predominating rather than the average time of each element of the operation. In setting a standard the timer is interested in knowing the frequency of occurrence of a given time rather than the exceptional occurrence of an extremely high or low time value. For example, a twenty cycle observation of a given element of an operation gives the following time values in seconds:



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... It is ...  
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... every element ...  
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... and ...  
... the ...  
... and ...  
... the ...  
... the ...  
... the ...  
... the ...



11-13-12-11-10-9-13-11-9-10-10-12-11-5-11-12-13-47-12-11

The value selected will not be affected by the occurrence of the extremely low value of 5 seconds nor of the 47 second occurrence. These two values are the exception to the rule and should not be considered because they do not occur under normal conditions.

In addition to the elements of the operation that occur with every piece completed there are other factors such as "handling of stock", "grinding of tools" etc. which must be considered and a normal average time determined.

By observation at the time of the study and by a close study of the plotted elements the timer rates the effort made by the operator during the period of the time study. When the observed times are modified by the rating the derived value is known as a normal time for the element. The sum of the normal times for the various elements is known as the normal actual time for the entire operation on one piece. To this normal actual time is added a rest percentage to take care of rest time and unavoidable delays. The resultant value is known as the standard time. This standard time is converted into a standard in Bedaux points by dividing by 60. The quotient resulting from this calculation is known as the point standard for the operation on one piece. A graphical representation of the method used in setting a standard is shown on the next sheet.

As a 60 point hour is the normal rate of effort expected from an operator, he is rated this value if at the time of the study he is working at a normal rate in the opinion of the time study man. If, however, the timer judges his speed and effectiveness at some different rate he







STOP WATCH TIME



OPERATOR'S RATING FACTOR



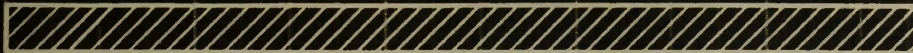
NORMAL ACTUAL TIME



REST FACTOR



STANDARD TIME



POINT STANDARD



GRAPHICAL REPRESENTATION  
OF  
STANDARDS DETERMINATION





is given that rating for the elements in the study. It can thus be seen that the rating value is the factor that converts observed time into normal time. The rating is usually made at the time of the study but in some instances, when the timer has had an opportunity to avail himself of all data, this rating may be deferred or even changed from the original rating.

Before the study is taken it is imperative that the foreman should assure himself that the job is being done by the correct method, with proper equipment and under such conditions as the foreman is prepared to maintain after the standard has been set.

The foreman is responsible for and has complete jurisdiction over the method employed. The responsibility of the time study man is the timing of the operation and the rating of effort. When the standard is once set it is guaranteed against change as long as the operation is performed as it was originally timed. Any addition or omission of job elements, change in material, or conditions of equipment calls for the setting of a new standard.

It is the duty of every foreman to notify the standards department when a change in method is to be made so that a proper standard for the new condition may be determined.

An illustration of the compensating effect of rating and the use of the rest factor follows. Two time studies on the same element of the operation result in the following data:

Study No. 1

Actual Time

10 seconds

is given that being for the elements in the study. It is then to  
seen that the setting value is the vector field component of the  
into normal form. The setting is usually made at the time of the study  
but in some instances, when the time has had an opportunity to well  
himself of all data. This setting may be referred to as the setting time  
the original setting.

Before the study is begun it is imperative that the person  
should assume himself that the job is being done. It is essential  
with proper equipment and under such conditions as the person is as-  
sured to maintain after the setting has been set.

The person is responsible for the study and the person is responsible  
the method used. The responsibility of the person is to the  
status of the person and the setting of the person is  
given and it is the person's responsibility to keep the person in  
position as it is originally stated. The setting of the person is  
essential, change in position, or position of the person is for the  
person of a new person.

It is the duty of every person to keep the person in position  
and when a change is made to keep the person in position. The person  
for the new condition may be determined.

An illustration of the responsibility of the person is the person  
of the person. The person is responsible for the person of the person  
the person is in the person's position.

1911-1912

1911-1912

1911-1912

1911-1912



Rating of Effort	Normal (60)
Normal Actual Time	10 seconds
Rest Factor	20%
Standard Time	12 seconds
Point Standard	.20

#### Study No. 2

Actual Time	8 seconds
Rating of Effort	75
Normal Actual Time	10 seconds
Rest Factor	20%
Standard Time	12 seconds
Point Standard	.20

If the observations have been taken by a skilled timer and the correct ratings applied the point standard will be the same regardless of the elapsed time of the operation at the time of the observation. However, a five percent variation is tolerated in comparative studies.

There are several characteristics which a time study man should possess if he is to be effective and successful in his work. The most outstanding of these are perhaps the following:

1. PATIENCE - An operator may irritate the timer, or the timer may irritate the operator. Patience goes far in eliminating this condition.
2. TACT - It may be necessary to ask questions and make suggestions to the operator and get his cooperation for the actual timing.





3. FAIRNESS - This must be practiced in all of a timer's dealings with the operators, and the same treatment accorded to each one. No favoritism must be shown.
4. ANALYTICAL MIND - The ability to analyze correctly is a major asset, as all of the information a timer gets on a job is valueless unless the timer can relate this information to the nature of the job.
5. PERSONALITY - A pleasing personality and appearance are other essentials. A pleasing personality helps in winning the confidence of the operators and a good businesslike appearance on the job commands the confidence of the operator in the work which a timer is doing. An operator can hardly be expected to have confidence in work which affects his earnings if it is done in a careless manner.
6. PSYCHOLOGY - What are the operator's thoughts while the operation is being timed? Is he thinking he can put something over on the timer? Does his appearance indicate that he is displeased at being timed? Is he giving the timer a good fair rate of effort during the study?

There are two types of elements that may occur in an analysis of an operation on a product of varying specifications. Due to this fact it is necessary to break the studies up into elements so that each one can be studied by itself. These two types of elements are as follows:

1. Constant Elements.

- (a) those whose magnitude is independent of the size of

3. **REMARKS** - This must be presented in full on the first page of the report, and the facts must be stated in full. The facts must be stated in full.

4. **ANALYSIS** - The analysis is the part of the report in which the facts are analyzed and the results are stated. It is the part of the report in which the facts are analyzed and the results are stated. It is the part of the report in which the facts are analyzed and the results are stated.

5. **CONCLUSIONS** - A concluding paragraph is required in every report. It is a paragraph in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated.

6. **REMARKS** - This is the part of the report in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated.

7. **REMARKS** - This is the part of the report in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated.

8. **REMARKS** - This is the part of the report in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated. It is a paragraph in which the results of the analysis are stated.



the article being timed.

## 2. Variable Elements.

- (a) those whose magnitude is depending upon the size of the article being timed.

After the constant elements are isolated it is necessary to determine their "spread", or in other words, the number of units of product which the constant elements covers.

After the variable elements are isolated it is necessary to determine the law which governs their variation. These elements vary according to some mathematical relationship of the product and these relationships must be determined so that tables of standards can be constructed which will cover any specification of product within the range of the analysis. It is obvious that it is not necessary to time study every variable size of product before standards are set up for a definite group. When the spread of the constant elements is known and the laws of variation of the variable elements are fixed it is a matter of substitution to determine the entire list of standards within the range of the table.

There are two major types of time studies used in the average plant. One study covers the type of operation where all the elements are performed by the operator and the other where the operator is running a machine which is equipped with a power feed.

In both of the above types of studies the point standard covers only the work elements of the job. In the study which uses the power feed machine a value known as M.A.A. -- machine assignment allowance --





is set up. This value indicates the time assigned to the machine for doing the job. As the operator is free during this period of time this value is really waiting time and is put into the departmental burden. The operator is given other work to do to eliminate this waiting time if possible. The elimination of M.A.A. is one of the outstanding savings of a point system application.

Two sample time studies follow this section. The first one is one in which all elements are performed by the operator and the second one covers a case in which the operator is running a power feed machine. In the latter study the allowance for M.A.A. is shown. When any of the work elements of the job occur during the M.A.A. time it is necessary to reduce the M.A.A. value so as not to pyramid the allowable credit.

In the construction of tables to cover a wide range of work of the same type, but of different sizes, it is necessary to develop unit times to be used in calculating standards for specifications that have not been time studied. These unit times will aid greatly in making comparisons.

A practical example of this method of analysis is shown on the next page. The problem in this particular instance was to develop standards for the removal by grinding of a constant amount of stock from a variable area per load and for paper machine knives of any length up to ninety inches.

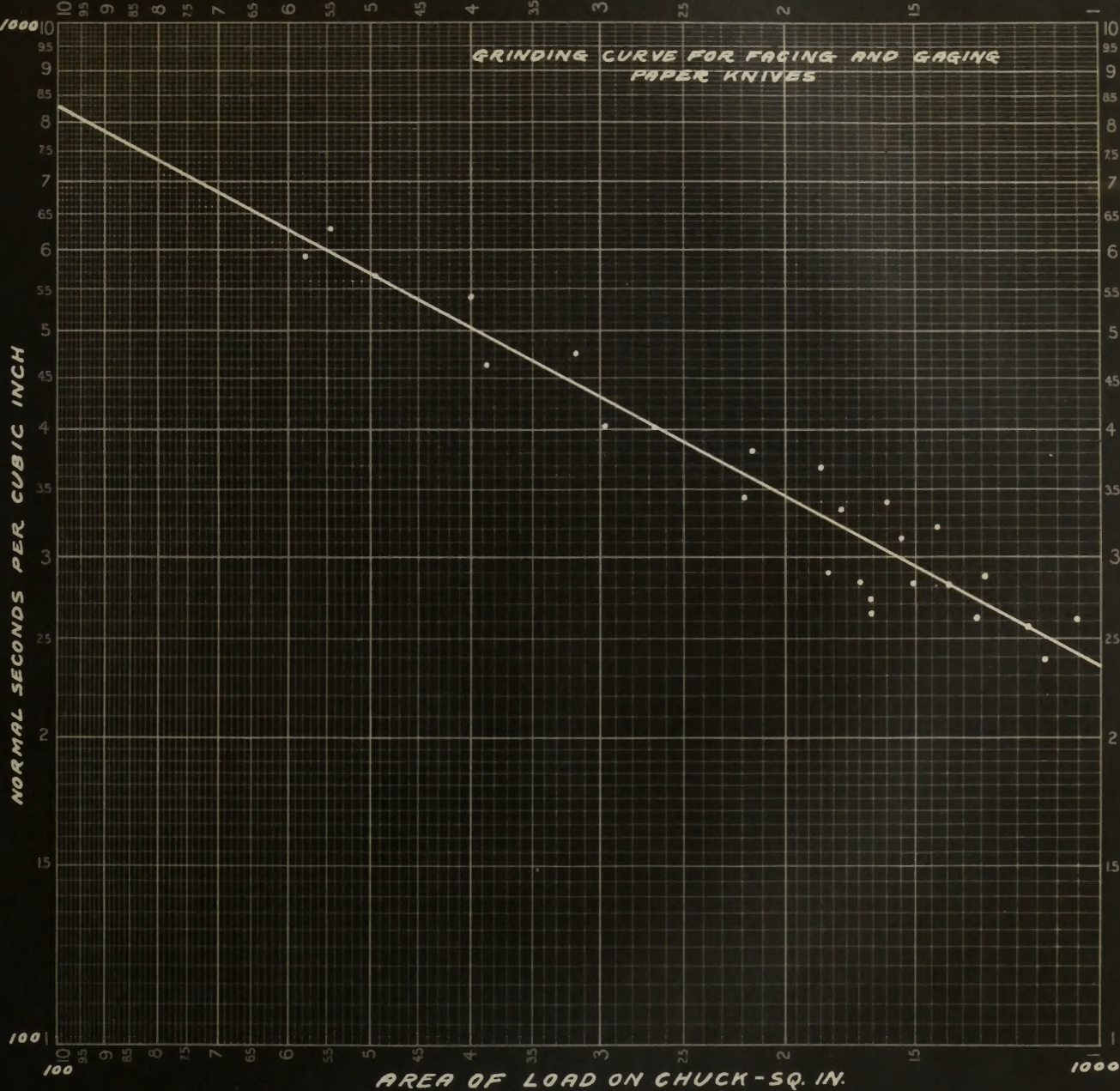
A job of this type divides itself into two sections because it is performed on a power feed machine. The logarithmic plot indicates the straight line relationship existing between the area of work exposed to





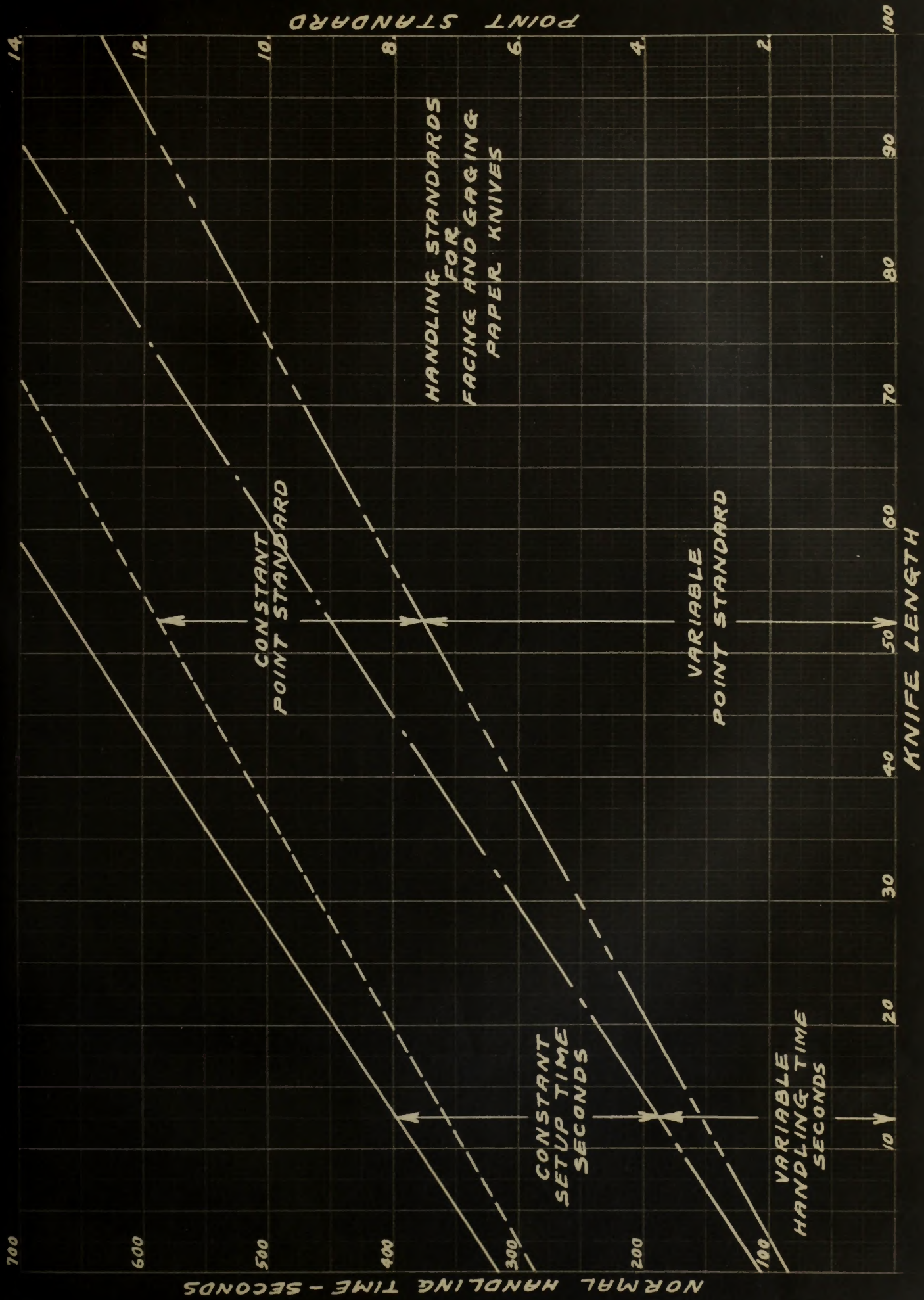
LOGARITHMIC SCALE CROSS SECTION

GRINDING CURVE FOR FAGING AND GAGING  
PAPER KNIVES













the grinding wheel and the normal time in seconds per cubic inch required for the removal of a constant amount from the thickness of the knives. This curve is for the grinding time and is the M.A.A. allowance for the operation.

The second plot gives a set of curves which make allowances for the handling of the knives incident to the grinding operation. Here the relationship of normal handling time and the variable point standards to the different lengths of knives is indicated.

Once standards are set up they are permanent as long as the method of performing the operation does not change. Increased or decreased employee earnings are controlled by the base rates. Monetary values may fluctuate but time values remain constant.





# TIME STUDY

DEPT. 7 DATE 3-3-30 STUDY NO. 1240  
 PART NAME Brick Liner (4-7/16 x 3 x 5/8)  
 OPERATION NAME Square Both Ends MACHINE NO. 17  
 OPERATOR'S NAME Brown OPERATOR'S NO. 413  
 TYPE OF MACH. Graham Grinder ENTRY NO. -  
 TOOL Norton Wheel (12 x 6 x 1") Grain 46, Grade N PROD. ORDER NO. 2637-A  
 MATERIAL Univ. Open Hearth SPEED 1400 R.P.M. FEED Hand  
 POINT STANDARD 2.8 M. A. STANDARD - TIME START 2.17 TIME STOP 2.37

	ELEMENTS	R	ACTUAL TIMES										NORMALS
A	Pick and place Liner	60	8	10	9	8	10	7	9	9	8	10	
B	Clamp and bring to contact	65	13	11	11	12	13	13	12	11	11	12	
C	Square 1st end	70	43	47	41	49	38	43	45	47	46	42	
D	Turn and bring to contact	65	7	6	5	6	6	7	5	4	6	6	
E	Square 2nd end	70	49	44	45	45	47	46	45	45	47	47	
F	Unclamp and away	55	6	5	5	6	6	5	4	6	5	6	
G													
H													
I													
J													
K													
L													
M	<u>Description of Operation</u> (A) Operator picks piece from bench 2 feet away and places on table of machine. (B) Clamps piece in vise and brings to contact with wheel. (C) Grinds 1st end by traversing table by hand. (D) Unclamps piece - turns - reclamps and brings to contact. (E) Grinds 2nd end by traversing table by hand. (F) Unclamps piece and places on bench 2 feet away.												
N													
O													
P													
Q													
R													
S													
T													
U													
V													
W													
X													
Y													
Z													

REMARKS \_\_\_\_\_ R. ALLOWED 20%  
 \_\_\_\_\_ TIMER R.E.  
 \_\_\_\_\_ PROVED \_\_\_\_\_











0.5  
 0.15  
 A. 0.2  
 0.1  
 0.12  
 0.2  
 0.05  
 0.05

0.5  
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0.5 0.15 0.2 0.1 0.12 0.2 0.05 0.05

0.5  
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 0.12  
 0.2  
 0.05  
 0.05



# TIME STUDY

DEPT. 7 DATE 3-3-30 STUDY NO. 1465  
 PART NAME Paper Knife (55 x 5 x 1/2)  
 OPERATION NAME Drill 2 1/2" Holes MACHINE NO. 53  
 OPERATOR'S NAME Severns OPERATOR'S NO. 236  
 TYPE OF MACH. Barnes Drill ENTRY NO. -  
 TOOL 1/2" High Speed Drill PROD. ORDER NO. 1462-B  
 MATERIAL #10 Steel SPEED 628 R.P.M. FEED Power Feed  
 POINT STANDARD 1.2 M. A. STANDARD .60 TIME START 1.12 TIME STOP 1.29

	ELEMENTS	R	ACTUAL TIMES										NORMALS
A	Pick and place Knife	65	14	15	16	14	14	15	17	16	15	15	
B	Clamp to template	60	10	9	8	8	9	11	10	10	9	8	
C	Bring to contact	65	4	5	4	4	4	5	3	6	5	5	
D	Drill 1st Hole		24	25	24	24	24	24	23	24	24	24	M.A.A.
E	Shift and to contact	70	6	5	5	4	5	6	5	5	6	5	
F	Drill 2nd Hole		24	24	24	25	24	24	24	23	24	24	M.A.A.
G	Unclamp from template	65	7	6	6	7	7	5	6	6	6	7	
H	Carry to truck (8')	60	5	5	4	4	5	5	4	4	5	5	
I													
J	File back of Knife	65	8	7	7	8	6	8	8	9	8	7	During MAA
K	Carry to Machine	60	5	5	4	6	5	5	4	5	4	5	During MAA
L													
M													
N													
O	<u>Description of Operation</u>												
P													
Q	(A) Operator picks knife 3 feet away and places on machine.												
R	(B) Clamps to template for drilling.												
S	(C) Bring drill to contact												
T	(D) Drill 1st Hole - Power Feed.												
U	(E) Shift Knife and bring drill to contact												
V	(F) Drill 2nd Hole - Power Feed												
W	(G) Unclamp from template.												
X	(H) Carry Knife to truck 8' away.												
Y													
Z													

REMARKS \_\_\_\_\_ R. ALLOWED 20  
 \_\_\_\_\_ TIMER R.E.  
 \_\_\_\_\_ APPROVED \_\_\_\_\_







# TIME STUDY SUMMARY

STUDY NO. 1465

A B C D E F G H J K

1	65	60	65	MAA	70	MAA	65	60		65	60	A	16.3
2												B	9.1
3			✓		✓		✓	✓			✓	C	4.9
4												D	24.0 -
5												E	6.1
6												F	24.0 -
7												G	6.9
8	✓									✓		H	4.6
9												I	-
10												J	8.2
11												K	4.9
12												L	61.0
13												M	
14	✓											N	
15	✓											O	48.0 - M.A.A.
16												P	8.2
17												Q	4.9
18												R	13.1 + 20% @ 80 (Rest)
19												S	= 11.8
20												T	
21												U	
22												V	
23												W	
24												X	
25												Y	
26												Z	
27													
28													
29													
30	15.0	9.1	4.5	24.	5.2	24.	6.4	4.6		7.6	4.9		
31													
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70													
71													
72													

NORMAL ACTUAL 61.0  
 R. % 20  
 STAND. TIME 73.0  
 PT. STAND. 1.2  
 MACH. ACTUAL 48.0  
 LESS 11.8  
 M. A. A. ACTUAL 36.2  
 M. A. A. STAND .60







## CHAPTER VIII

### APPLYING A DEPARTMENT





## APPLYING A DEPARTMENT

One of the most critical times of the application is the time that a department is put on standard. The foremen and operators of the particular department are notified that on a certain date the department is to be applied. The operators are also told that for the time being their present guaranteed hourly rates will be continued. That is to say, they will continue to receive as a minimum wage that amount which they have been receiving and greater earnings if their production increases so as to give them a premium payment on top of the base wage for the job. If the sum of the base wage and the premium exceed the prevailing guaranteed wage they will receive the higher amount. The operators have everything to win and nothing to lose.

This arrangement of guaranteeing the present earnings to the men is made by the management while the operators are adapting themselves to the system. It makes it possible for the men to go through this period of transition without financial loss to them. The management in doing this reserves the right to discontinue the existing guaranteed rates at any time they may see fit.

One of the outstanding principles of the point system is the fact that the standards are guaranteed for the life of the job as long as the original method of doing the job exists. This principle is strictly adhered to and no changes are made unless they are justified by the above statement. This point is clearly explained to the men at the very start of their working on standard. Due to the fact that some operators







have been on piece work previous to the application they are sometimes hesitant about believing that such a condition will exist. They have in their minds the old practice of cutting piece rates when earnings became excessive.

The department point hour starts at a comparatively low figure sometimes until the men assure themselves that the standards as set up will prevail. However, as soon as they feel confident that conditions will be as they were promised their production increases and the department point hour begins to rise in proportion.

The graph on the next page indicates the increase in the point hour of a department after applying standards to it. The starting point hour and immediate increase noticeable from this point was due to the fact that this was a service department which had to work fairly rapidly even before the application due to quick shipments and also due to the fact that it was a small department where a good deal of contact work had been done previous to applying the department.

The following six points should be made clear to every operator about to go on standard:

1. The Standards set include the actual time necessary to perform the operation plus the proper allowance for rest required by the operation.

2. All Standards set are guaranteed against being cut for the life of the operation and cannot be reduced unless there is a change in the process, material, design, or equipment.

3. The standard requirement for each operator is 60 "Points"



have been on the same basis as the other two, but the  
particulars of the latter are not given. The fact  
in their case is the question of whether they are  
income tax payers.

The Government has been asked to consider the  
question of the tax on the income of the  
individuals. However, it is not clear from the  
will of the Government whether the question is  
will be on the same basis as the other two, and the  
Government has been asked to consider the question.

The Government has been asked to consider the  
question of the tax on the income of the  
individuals. However, it is not clear from the  
will of the Government whether the question is  
will be on the same basis as the other two, and the  
Government has been asked to consider the question.

The following are the questions which are  
being considered by the Government:

1. The Government has been asked to consider the  
question of the tax on the income of the  
individuals. However, it is not clear from the  
will of the Government whether the question is  
will be on the same basis as the other two, and the  
Government has been asked to consider the question.

2. The Government has been asked to consider the  
question of the tax on the income of the  
individuals. However, it is not clear from the  
will of the Government whether the question is  
will be on the same basis as the other two, and the  
Government has been asked to consider the question.

3. The Government has been asked to consider the  
question of the tax on the income of the  
individuals. However, it is not clear from the  
will of the Government whether the question is  
will be on the same basis as the other two, and the  
Government has been asked to consider the question.



POINT HOUR

PLOT SHOWING INCREASE  
IN POINT HOUR AFTER APPLYING  
STANDARDS TO A  
TYPICAL DEPARTMENT

WEEK ENDING

6-22-29

6-29-29

7-6-29

7-13-29

7-20-29

7-27-29

8-3-29

8-10-29

8-17-29

8-24-29





per hour. Operators are credited with "Points" for good work only.

4. All points earned in excess of 60 points per hour are premium points and are paid for at a rate in proportion to the base rate of the job.

5. Each operator on the "Point System" is paid an hourly wage for the time he spends in the plant. This hourly wage is called the "Base Rate".

6. All delays beyond the control of the operator are paid for at the rate of 60 "Points" per hour or at the base rate.

7. At the beginning and end of each delay the operator must report the delay and the reason for it to the checker. Only those delays so reported will be credited.

The early stages of the application are the most critical and it is at this point that the cooperation of the foreman is most needed. Questions arise from the operators and a good deal of contact work must be done by the standards department to tactfully straighten out many matters and keep the men satisfied. The point hours are usually low for the first days and many operators are disappointed in their showing and their premium earning. The company will eventually expect an eighty point hour from the men and they should be shown that by maintaining this rate of effort their earnings will be appreciably more than they were under the previous wage plan that they worked under.

The greatest show of opposition, if there is any, will be during the first few weeks after applying the department. The first depart-





ment applied usually presents the most difficult situation to handle. After several departments have been successfully applied there is no great amount of opposition from the remaining departments when they are applied.

Most of the operators have been working under the old day work plan and have thus had no incentive to increase their production and neither has the management had any measure of what constituted a day's work. Now the management knows that it can expect an eighty point hour and will eventually demand it from all operators.

Experience has shown that the point hour effort of most workers on day work is between thirty five and forty five. It takes some time for a day work operator to learn to make use of all possible time and his habits of years cannot be changed in a few days. It usually takes several weeks for an operator to reach an eighty point hour but when he does attain it he usually retains that pace with but minor fluctuations.





## CHAPTER IX

### RECORDING PERFORMANCE OF OPERATORS





## RECORDING PERFORMANCE OF OPERATORS

Upon applying standards to a department it is necessary to also start keeping the production records of the individual operators. From these production records the operator's daily point hour and premium earnings are determined.

Under the old day work plan each operator kept his own time card for the day's work and indicated approximately how long it took to perform the operations on the various lots of work completed during the day. With the point system these daily records of production are not kept by the operator but by a departmental checker. The keeping of time cards with the associated data is entirely a clerical job and should be handled by a clerk who is proficient at this type of work and not by the operators themselves.

The checker keeps a record of the individual performance of each man on time cards. These cards will be different in every plant in which they are used because different organizations desire different types of information and it is necessary to design a card to give the required data. As an example, three typical forms of cards are shown on the next page. An example of card figuration will be given in the chapter on "Accounting Procedure". These cards give a complete record of the operator's daily activities and give such information as the following:

1. Name and number.
2. Time spent in the plant for the day.







MCH. NO. MCH. NO. MCH. NO. MCH. NO.						OPERATION		KIND AND SIZE		MCH. NO. MCH. MIN. CREDIT		LABOR CLASSIFICATION		ORDER NO.		FIGURATION	
STOP	START	TIME CREDIT		MACHINE MIN. PAC.													
																	TIME WORKED
																	NO. MACHS.
																	MACH. RUN
																	MINUTES
																	TOTAL CREDITS
																	NET MACH.
																	RUNNING MIN.
																	TIME WORKED
																	TOTAL TIME CREDIT
																	NET AVAILABLE
																	WORKING TIME
																	M. A. A. CREDIT
																	IF NET AVAILABLE WORKING TIME IS
																	GREATER THAN NET MACH. RUNNING
																	MIN. DIFFERENCE IS CHARGED TO
																	M. A. A. IF LESS NO M. A. A.
TOTAL CREDITS						PROD. CAP. = $\frac{\text{TOTAL MACH. MIN.}}{\text{M. A. A. PER CYCLE}}$ = _____											
						ACTUAL PROD. = $\frac{\text{ACTUAL}}{\text{PROD. CAP.}}$ = _____											

Form 113

[illegible]





3. Starting and stopping time for all jobs.
4. Name and specifications of all items.
5. Number of pieces completed.
6. Point standard for each piece.
7. Designation by proper symbol if work is not on standard.
8. Production or order number of each item.

The checker obtains the information indicated by circulating around the department and visiting each operator as frequently as possible. In some plants the operator goes to a checker's cage with the job ticket and has it recorded but the former method is by far the more efficient because the operators have no lost time from their work.

Each checker is provided with a complete set of standards for all the operations performed in his department. He must be thoroughly familiar with all the operations in the department and with the location in his standards books of the corresponding standards. The checker posts these standards on the card against the number of pieces completed by the operator on any given job. The tables of standards are constructed by the standards department with the attempt to make their interpretation as easy as possible and to facilitate the checking process. It is imperative that the checker be a man who is familiar with mechanical equipment and also that he be extremely accurate and careful in his work. This last quality is especially desirable because the individual card for any operator becomes the basis for the calculation of that man's pay for the day and the accurate determination of wages is of paramount importance. In this connection it might be said that it has been found extremely helpful to give candidates for checking jobs a set of examinations to

1. Operator and stepping line for all items.

2. Items and measurements of all items.

3. Number of pieces required.

4. Total material for each item.

5. Designation of proper material to be used.

6. Production or other matter as well.

The checker obtains the information indicated by instructions

issued the department and entering each operation as follows:

First, the checker places the operation card in a checker's bag with the

job listed and has it inspected by the checker before he leaves the

work efficient before the operator has to leave the job.

Each checker is provided with a complete set of standards for all

the operations performed in his department. He must be thoroughly

familiar with all the operations in the department and with the location

in his standards book of the corresponding material. The checker puts

these standards on the job and against the items of pieces required by

the operator as they come in. The checker or checker's assistant

in the standard department with the checker to make these inspections

as they are possible and to fill in the checker's book. It is found

that the checker is a very important part of the department and

and the fact that he is extremely accurate and careful in his work.

For further information regarding the checker's work, see the

operator's manual for the checker's work and the checker's

day and the account of the checker's work in the department.

In this connection it should be noted that the checker's work is

helpful in the standard department and in the checker's



test their power of reasoning and their familiarity with the use of figures.

Another reason why time cards must be accurately kept is because of the fact that the factory production records are derived from them.

The checking cards go to the cost department daily from the standards department where they have been checked for possible omissions and errors. The payroll calculations carried out in the cost department will be considered in the section on "Accounting Procedure".

To aid the cost department in their cost analysis a set of symbols are developed and used on the cards by the checker for such items as shutdown, waiting time, breakdown time, etc.

Each checker is given a set of standard instructions which guide him in his work and which also makes all checking procedure uniform. This is absolutely essential in a plant where a large number of checkers handle several hundred cards daily. A typical set of these instructions follows. These rules will have to be modified to suit the particular application but in content they will be essentially the same in any plant with a point system application.

#### STANDARD INSTRUCTIONS

#### FOR

#### CHECKERS

##### 1. General.

The checker must report accurately, on checking cards, the following information:

that this group of persons will be the first to be

known.

Another reason why this must be done is that it is

of the fact that the last of the persons who are

The standing order is to be the same as the one

with the same name they have been known for many years

years. The general collection of the same is

will be considered in the section on "General

To all the rest of the persons who are

points are developed and used in the same way as

in the same way, the same, the same, the same.

Each section is given a set of standard instructions

and in the same way as the other instructions

This is especially essential in a large number of

single several hundred cases, a typical set of

follows. These cases will have to be collected

collected but in some cases will be something

that with a point system.

STANDARD INSTRUCTIONS

FOR

THE

1. General

The first part of the instructions is the same

the instructions



- (a) Operation name or symbol.
- (b) Kind and size of article.
- (c) Machine number, feed and speed.
- (d) Number of completed pieces.
- (e) Starting and stopping times of all day work jobs by classes of product, including the elapsed time.
- (f) Point and M.A.A. standards.
- (g) In and out time punched on clock cards.
- (h) Operator's name, number, department, date, and rate according to rule for use of rates.
- (i) Production order number with classification name placed before the number, such as knife, circular, specialty, etc.
- (j) Show separate time for each operation not on standard, on all cost jobs, and designate cost jobs by placing a large C before the production order number.

## 2. Use of Symbols.

The following symbols are to be used for all items on the card not on productive work on standard. These symbols are placed before the name of the operation and the operation name must be clear and understandable. It is permissible to abbreviate all symbols as shown.

D.W. - Day Work - All productive work for which you have no standards. Keep the time separate for different classes of material, such as paper knives, circulars, etc.

S.D.W. - Special Day Work - Experimental work, repair work, etc. Call the standards department when you have items that you think fall in this group.





R.T.D. - Re-operation Caused by This Department.

R.O.D. - Re-operation Caused by Other Departments.

R.T.O. - Re-operation Caused by and to be Charged to This Operator. On re-operation items report the time spent on such work and the department responsible.

S.U. - Setting Up, or getting machine ready for work. Keep the set up and break down time separate and report the order number to which the work applies, especially if for a cost job.

W. - Waiting - This includes waiting for work, giving instructions, talking to timers, inspectors, etc. When one operator is teaching another give the man using the tools credit for the work and give the other waiting time receiving or giving instructions.

B.D. - Break Down - Machines shut down for lack of power, or because of break down.

H. - Handling or trucking material.

Cl. - Clerical Work, such as checking, office work, booking orders, etc.

S.D. - Shut Down - Time an operator is paid for but is out of the plant. Under this item comes time for circus parade, picnic, company business, etc. Only those operators who work in the morning get S.D. credit for the picnic. Club Council members get all day S.D. if working for the picnic.

4.1.1. - The operation is based on the following:

4.1.2. - The operation is based on the following:

4.1.3. - The operation is based on the following:

4.1.4. - The operation is based on the following:

4.1.5. - The operation is based on the following:

4.1.6. - The operation is based on the following:

4.1.7. - The operation is based on the following:

4.1.8. - The operation is based on the following:

4.1.9. - The operation is based on the following:

4.1.10. - The operation is based on the following:

4.1.11. - The operation is based on the following:

4.1.12. - The operation is based on the following:

4.1.13. - The operation is based on the following:

4.1.14. - The operation is based on the following:

4.1.15. - The operation is based on the following:

4.1.16. - The operation is based on the following:

4.1.17. - The operation is based on the following:

4.1.18. - The operation is based on the following:

4.1.19. - The operation is based on the following:

4.1.20. - The operation is based on the following:

4.1.21. - The operation is based on the following:

4.1.22. - The operation is based on the following:

4.1.23. - The operation is based on the following:



MN - Maintenance - Taking care of machines such as cleaning, oiling, repairing, grinding tools, etc.

MN. O.D. - Maintenance for Other Departments - Work such as grinding tools, etc. Specify department for which work is done.

Supr. - Supervision - Time spent by foreman or assistant foreman supervising or instructing operators.

Mal. - Miscellaneous Allowed Time - Includes wash up, work on committees, looking for tools, going to the hospital, work on Club Council, Veterans' Association, etc.

### 3. Use of Rates.

A. Base rates are set according to the skill required and the working conditions of the job. You have a base rate sheet giving the base rates on all of the jobs and machines in your department. Each operator's card carries a single base rate, and if you have instructions to use two rates for any operator you must pass in two cards each carrying a single rate.

B. There are several cases on the use of rates.

1. Where the operator's rate is higher than the base use just the base rate.

2. Where the operator's rate is the same as the base rate use just the base rate.

3. Where the operator's rate is less than the base rate use both rates.

IV - Maintenance - During one of our visits to the...

other, possibly, building tools, etc.

VI - Maintenance for other departments - This trip to

building tools, etc. possibly the other side of the road in town.

VI - Supervision - This visit to the building tools

was supervised by the building tools.

VI - Miscellaneous - This trip to the building tools

building tools, possibly the other side of the road, etc.

VI - Miscellaneous - This trip to the building tools

### 3. The 1st Report

1. How many and what kind of building tools are there in the

working conditions of the job. You have a list of building tools in the

list of building tools on all of the jobs and building tools in your department. You

operator's card carries a single type code, and if you have building

tools you use the same for any building tools you use in the code.

and carrying a single type.

2. How many building tools are there in the list of building

tools. How many building tools are there in the list of building

tools and the same type.

3. How many building tools are there in the list of building

tools and the same type.

4. How many building tools are there in the list of building

tools and the same type.

and the same type.



4. Certain operators are classed as indirect workers, on their cards. You will enter both rates, regardless of which is higher or lower.

5. When an indirect worker does work on production give him the base rate of the job on which he spends the most time. Report also his guaranteed rate.

6. Turn in a card for all foremen for every day including holidays, except Sunday, and mark these cards with a 69¢ base rate. The assistant foreman's card will carry his guaranteed rate except as modified by his doing productive work.

7. If an operator does work during M.A.A. which carries a lower base rate than the job with M.A.A., mark his card with a single rate, which is the rate of the job having M.A.A. When an operator does work during M.A.A. which carries a higher base rate than the M.A.A. job, pass in a card and mark the base rate of the job, for each job. This means two cards with different rates.

#### 4. Use of Cards.

A. Buff cards are to be used in all cases except where an operator runs two or more machines at the same time.

1. Each card must carry complete information so that the operator's pay and premium may be correctly figured.

2. If standards specify a closed cycle put this on the card, with the time for the job, if the operator works on an





open and closed cycle on the same day. It is necessary to know the total elapsed time on closed and open cycles where they both occur on one card.

3. Whenever an operator does work on standard, or day work during the M.A.A. of another job, such work having no M.A.A., report this production separately on the card and mark it "During M.A.A.". If all jobs have M.A.A. report the work on blue cards. No separate time is necessary if the job done during M.A.A. is on standard.

B. Multiple Machine cards are used whenever an operator runs two or more machines, all of which have M.A.A.

1. Report all of the work on standard on the front of the card and enter no time on this side. Enter all point and M.A.A. standards for each job.

2. On the back of the card report all day work and down time by machines, with the starting and stopping times for each item.

3. If all of the machines usually run by an operator are down and he is doing some other work, which is on day work, report his machines as down and enter the time in the machine minutes column and the time credit column. If the work is on standard report just the down time of his regular machines on the back of the card.

4. Under the heading figuration at the right of the card

upon the closed ends of the wire. It is necessary to have  
the closed ends in closed and open positions. The closed  
ends are on one end.

2. However, as the wire is wound on the closed ends, it is  
during the W.L.A. of another job, and work during W.L.A.  
report this procedure separately in the end and part of the  
W.L.A. If all jobs have W.L.A. report this work in the end.  
No separate time is necessary for the job done during W.L.A. in an  
element.

3. Multiple machines - If a machine is used in a separate  
job or more machines, all of which have W.L.A.

4. Report all of the work on closed ends on the front of the  
card and enter on the end of this card. Enter all points on W.L.A.  
standards for each job.

5. In the back of the card report all of the work and  
time by machine, with the starting and stopping times for each  
time.

6. If all of the machine working was in an operation, the  
down and be in doing some work, such as an end work, the  
front side machine as down and enter the time in the machine  
minutes column and the time worked column. If the work is on  
standing report that the time of the machine machine on  
the back of the card.

7. When the machine is in the back of the card  
- 2 -



report the number of machines operated.

C. Stroke Counter cards are used on all machines having stroke counters.

1. If an operator runs two or more machines handle the card in the same way as a blue card. If only one machine is being run handle like a buff card.

D. Checkers are responsible for reporting the time of all operators doing work in their department. This means you must watch transfers of operators and pass in a card for every man regularly employed in the department or temporarily transferred there.

If an operator leaves your department to work in another you are to report the time he leaves and the time he comes back. The checker in the other department will take care of his time while he is away.

E. All except overtime cards must be in the hands of the standards department by 7 A.M. and overtime cards as early as possible after 7 A.M.

Checkers are not to come upstairs to make corrections on cards. If you have a correction call up and it will be made. Your place is in your department from 7 to 5 and no checker is to leave his department without permission from the standards department.

F. Standards will not be used on any card unless the operator has at least 1/2 hour on standard, including M.A.A.

Report the results of your investigation.

2. Check the results of your investigation and report the results.

3. Check the results of your investigation and report the results.

4. If an investigation is conducted, it should be conducted in a systematic manner and the results should be reported in a clear and concise manner.

5. Check the results of your investigation and report the results. This should be done in a clear and concise manner and the results should be reported in a clear and concise manner.

6. If an investigation is conducted, it should be conducted in a systematic manner and the results should be reported in a clear and concise manner. This should be done in a clear and concise manner and the results should be reported in a clear and concise manner.

7. All investigation results should be reported in a clear and concise manner. This should be done in a clear and concise manner and the results should be reported in a clear and concise manner.

8. Check the results of your investigation and report the results. This should be done in a clear and concise manner and the results should be reported in a clear and concise manner.

9. Check the results of your investigation and report the results. This should be done in a clear and concise manner and the results should be reported in a clear and concise manner.



## 5. Transfer of Operators.

A. If an operator is on his regular work part or all day mark the card with the base rate for that job.

B. If an operator is shifted to a job having a higher or a lower base rate than his regular job, mark the card with the base rate of the new job and if it is less than the operator's customary base rate leave off the customary base rate, but if higher, then use both the operator's customary base rate and the new rate.

C. If a man is on several jobs with different rates use his customary base rate.

D. If an operator goes to another department his customary base rate will not change providing he goes onto a job with a higher rate than his customary rate. If the new job has a lower rate, then he takes the lower rate.

E. Special rules not in accord with the above must be followed in place of the above rules.

## 6. Use of Lost or Rejection Reports.

A. The foreman will make out and sign all lost reports. He will take care of the original and you are to take care of the duplicate. It is essential that the report be complete with all information that is asked.

B. If the operator is responsible for the loss be sure to fill in the penalty, if the job was done on standard. If the job was done day work mark it on the duplicate. Let the foreman decide who

A. If an operator is on the regular rate and is paid at all the time the work with the same rate but at a job.

B. If an operator is entitled to a job having a higher or a lower than rate than the regular job, and the rate with the new rate of the new job and if it is less than the operator's customary rate, he shall leave off the customary rate, and if higher, then use both the operator's customary rate and the new rate.

C. If a man is on several jobs with different rates, and the customary rate is:

D. If an operator goes to another department in the company, his rate will not change provided he was on a job with a higher rate than his customary rate. If the new job has a lower rate, then he takes the lower rate.

E. General rules not in accord with the above may be followed in place of the above rules.

2. Principle of Adjustment

A. The foreman will take out all right all last records. He will take care of the material and give the same rate of the type. It is essential that the record be complete with all latest action that is asked.

B. If the operator is transferred for the last he was on, this in the present, if the job was taken on already. If the job was done day work and it on the regular rate, let the foreman verify the



is responsible for the spoiled work.

C. An operator gets Rejection Credit when he picks out bad pieces spoiled by some previous operator.

1. If the operator rejects a piece after he has done some work on it he gets full credit for his operation and no separate entry is needed on the card.

2. If no work is done on the rejected piece make out a rejection report.

3. In case a foreman or inspector condemns a whole lot of work the operator gets Rejection Credits just for the pieces already done and not the entire lot.

D. In case a rejected piece is lost, or spoiled completely, put all of the information on one report.

E. Your copy of the lost report is to be attached to, and passed in with the operator's card.

#### 7. Use of Re-operation Ticket.

A. These tickets are to be used in all cases where an operator does work over which was previously done by himself or some other operator.

B. Make the ticket out completely and be sure to specify the operator who caused the re-operation. If previously done on standard there is a penalty and the penalty space must be filled in. If previously done on day work there is no penalty and mark day work in the

5. An operator who is unable to perform his duties

shall be relieved by some qualified operator.

6. If the operator reports a phase after he has been  
with on it he shall still credit his operation and no separate  
entry is needed on the card.

7. If no work is done on the rejected phase and a  
rejection report.

8. In case a foreman or supervisor reports a phase  
and the operator reports a rejection credit for the phase  
already done and not the phase lost.

9. In case a rejected phase is lost, no credit should  
be given for the information on one report.

10. For each of the last report to be attached to the  
report in which the operator's credit

is given to the operator.

11. These tickets are to be used in all cases where a report  
does not cover which was previously done in a report or other

12. When the ticket is completed and is sent to credit the  
operator who caused the re-operation. It previously done in a report  
there is a penalty and the penalty phase shall be listed in. If no  
penalty phase in the report there is no penalty and the phase is the



penalty space.

C. Separate time must be shown on the time card for all items of re-operation and be sure to show on the ticket the symbol used on the time card.

D. Send the re-operation tickets in with the time cards.

8. Use of Complaint Slips.

A. These slips are to be used to notify the standards department that an operator questions the posting on the posting sheet.

B. The clock time, which the operator punches daily upon entering and leaving the factory, must agree with the in and out time on the checking card.

1. Operators working Saturday afternoon will be paid only for the actual amount of time which they spend at their machines. There will be no lunch allowance for this work unless the operator works after 5 o'clock.

2. When an operator works overtime his card should be marked with the time he stops work and with the time his clock card is rung out. Stop his time as usual, then put on the checking card (clock card out 8:39).

3. Operators working three hours or more overtime, except Saturday afternoon, get Mal. credit of  $1/2$  an hour for lunch, whether they take it or not. An operator must work at his machine three hours or more to get credit for lunch. An operator going out at 5 and coming back at 5:30 and then working

C. Separate time must be shown on the time card for all time at re-operation and be shown on the right of the time card as the time card.

D. Give the re-operation a check in with the time card.

## 2. Plan of Operating Time

A. These plans are to be used to notify the re-operation department that an operator requires the re-operation of the machine.

B. The check time, which the operator requires for each machine and leaving the factory, must agree with the time on the time card checking card.

C. Operators working Saturday afternoon will be paid only for the actual amount of time which they spend at their position. There will be no compensation for this work unless the operator works after 5 o'clock.

D. When an operator works overtime his card should be marked with the time he works over and with the time his clock card is rung out. Keep his time as usual, then add to the checking card (check card not 8:00).

E. Operators working three hours or more overtime, will get Saturday afternoon, and half of 1/2 of hour for lunch, whether they take it or not. An operator will not get his machine three hours or more to get credit for lunch. An operator going out at 5 and coming back at 8:30 and then working



until 8 o'clock does not get any allowance since he has worked only 2-1/2 hours overtime.

C. Tower workers are those operators who work continuously for a period of 8 hours from 7 to 3 or from 3 to 11. These men are allowed 20 minutes for lunch and this is symbolized Mal. In addition, they are allowed three (3) cents over their regular hourly rate for working on a tower shift. Mark these cards with the base rate plus three cents as follows: 54 3.

If a tower worker should work from 3-5 in addition to his regular shift give him the tower rate for the whole day.

#### 10. General Instructions.

A. Report to the standards department (in writing, if important) of any unusual occurrences, changes in methods or equipment, or anything that might warrant a change in standards of routine.

B. Put all work, for which you have standards, on standard and notify the standards department when operators work with poor material or under poor conditions.

C. If difficulties are encountered the checker shall immediately get in touch with the standards department.

D. It is the checker's function to get all records of work and in no case must he allow the operator to do this for him. The checker gets his information by visiting each man at frequent and regular intervals.

E. You are to use only those standards for which you have entries

shall be afloat and not be in possession of the vessel

only 2-1/2 hours overtime.

C. These sections are those operators who work continuously for a period of 8 hours from 7 to 5 or from 5 to 12. These men are allowed 20 minutes for lunch and this is equivalent to 1/2 hour. They are allowed three (3) hours over their regular hours for working on a tower shift. These men work with the men who work three shifts as follows: 24 H.

If a tower worker should work that day in addition to his regular shift give him the tower rate for that shift day.

#### 10. General Instructions.

A. Report to the supervisor immediately (in writing, if important) of any unusual occurrence, changes in methods or equipment, or any thing that might warrant a change in standards or methods.

B. Put all work, etc. which you have completed, on standards and notify the standards department when operators work with you instead of what you could learn.

C. If difficulties are encountered the operator shall immediately report in touch with the standards department.

D. It is the operator's function to get all records of work and in no case shall he allow the operator to do this for him. The operator shall his information by meeting each one of the standards and regular rates.

E. For any and only those standards for which you have interest.



in your standards book. Standards made up by interpolating or extrapolating and figuration of approximate sizes will not be tolerated, except in those cases where a rule for figuration has been given and is included with the standard.

F. Do not make any additions or erasures on your standards cards. If more information should be put on a standards card send it up to the standards department with instructions. A lot of confusion has been caused by checkers making notes or entries on standards cards.

G. It is your responsibility to keep your book in good condition and neat looking. Any materials you may need will be gladly supplied to you upon asking for them.

H. Devise some definite method of checking your cards at night so as to avoid letting any errors slip by you. This is a necessary thing and will help you materially in keeping your errors down.

A checker has several other duties which are intimately related to his job. These have to do with the use of re-operation tickets, lost reports and complaint slips. All these are necessary in a point system setup. The first two act as bars to bad and spoiled work and the last is a notice to the standards department that the operator is questioning his daily record. A print showing these three forms is given on the next page.

An operator is paid premium for good work only. If he spoils a piece he is penalized for it. This penalty is against his daily premium and is equal to the point value of the operation times the number of pieces spoiled, at a monetary value per point, depending on the base



at your standard book. Standards made up by inspection of the  
material and inspection of specimens given will not be sufficient.  
except in those cases where a rule for inspection has been given and  
is included with the standard.

7. Do not make any addition or subtraction to your standard book.  
If more information should be put on a standard card send it up to the  
standards department with instructions. A lot of confusion has been  
caused by changes being made on certain standards cards.

8. It is your responsibility to keep your book in good condition  
and neat looking. Any material you put away will be in the way  
of the material you need.

9. Review your standard book of changing your cards at night  
so as to avoid getting any errors into the book. This is a necessary  
thing and will help you materially in keeping your standard book.

A checker has advised that better which are indicated by  
in the book. These have to do with the use of re-operations and  
test reports and specimens and all these are necessary in a  
specimen report. The first two are not to be used until they are  
the first is a notice by the standards department that the specimen is  
proceeding to the daily record. A notice should then be given to  
give on the next page.

In operator is said to be the good work only. It is said  
that he is permitted to do it. This quality is called the daily  
and is equal to the actual value of the operation times the number  
of pieces produced, at a standard value per piece, depending on the



Form 132

## REPORT OF LOST OR REJECTED PRODUCT

QUANTITY	KIND	SIZE	ORDER NO.
1	Plated Liner	25 $\frac{1}{4}$ x 2 $\frac{1}{2}$ x 5/8	PROD. NO. 55999-B

Cause

Ground too thin

Where Lost

## PENALTY

Operator's No. 441

Face

No. Pcs.	Strd.	Pts.	B. R.	Std. Cost
1	2.0	2.0	54	

Date 3-6-30

Where Found

## REJECTION CREDITS

Operator's No. 493

Gauge

No. Pcs.	Strd.	Credits	B. R.

Date 3-6-30

Disposition Scrap

Kind of Steel #10

Date 3-6-30

E.L.

Foreman

Form 87

## RE-OPERATION TICKET

Date 3-6-30

QUANTITY	KIND	SIZE	ORDER NO.
146	Cutters	4-3/8 x 008 x 3/8	PROD. NO. 40582-A

## REASON FOR RE-OPERATION

Not beveled sharp enough

CAUSED BY  
OPERATOR

954

DATE 3-5-30

DEPT. 19

## — PENALTY —

TIME STARTED 11.10

RATE

LABOR COST

TIME STOPPED 4.55

51

ELAPSED TIME 280

RE-OPERATED BY 954

OPERATOR'S NO.

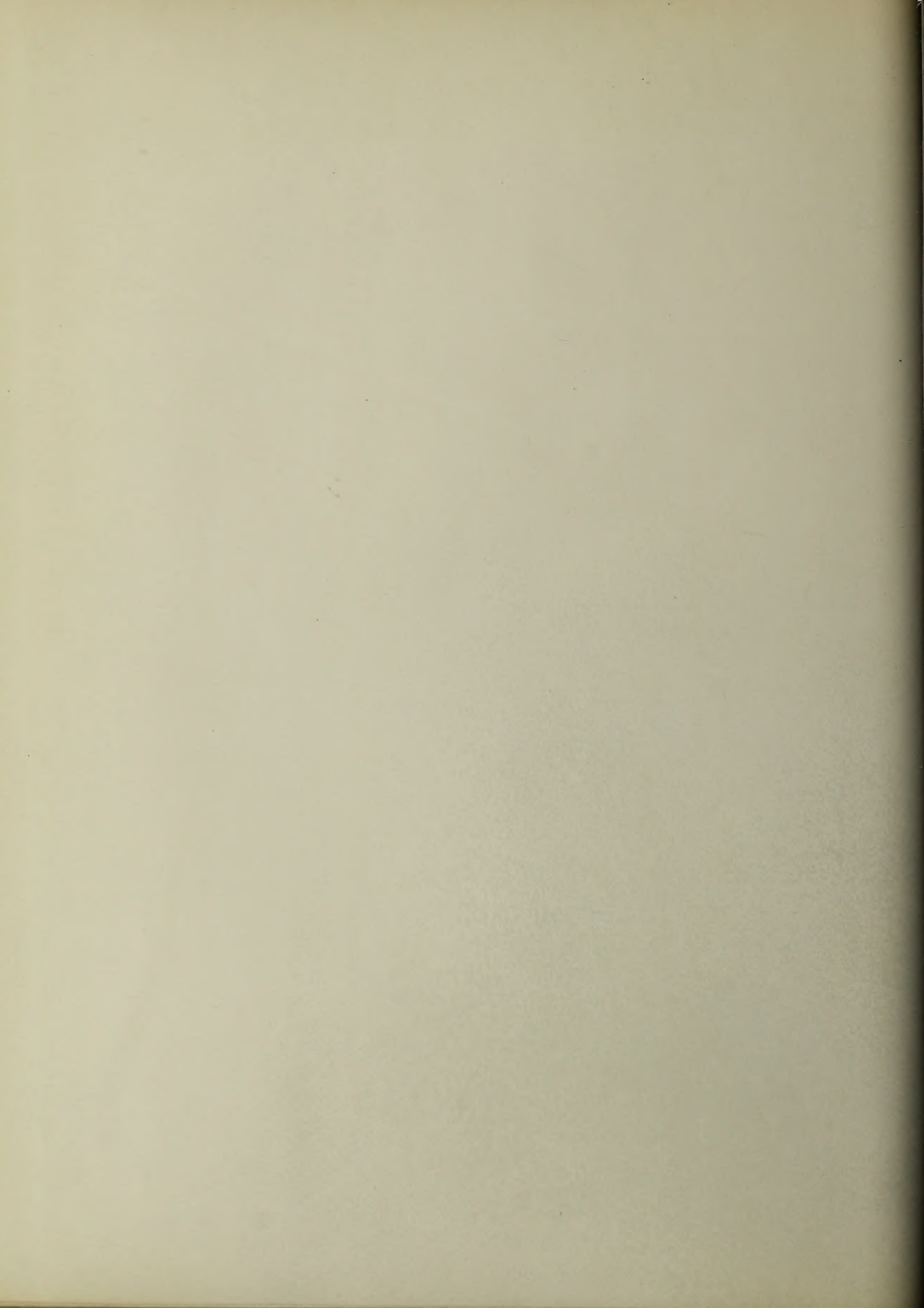
OPERATION Rebevel

## REMARKS

SYMBOL R.T.O.

Field

FOREMAN





WORKMAN NAME DEPT. DATE  
No. 143 Brown 13 3-6-50

Please investigate

Point Hour

Number of Pieces

Premium

Time

Prod. Ord. No.

Standards

Rate

Symbols

Operations

\_\_\_\_\_

\_\_\_\_\_

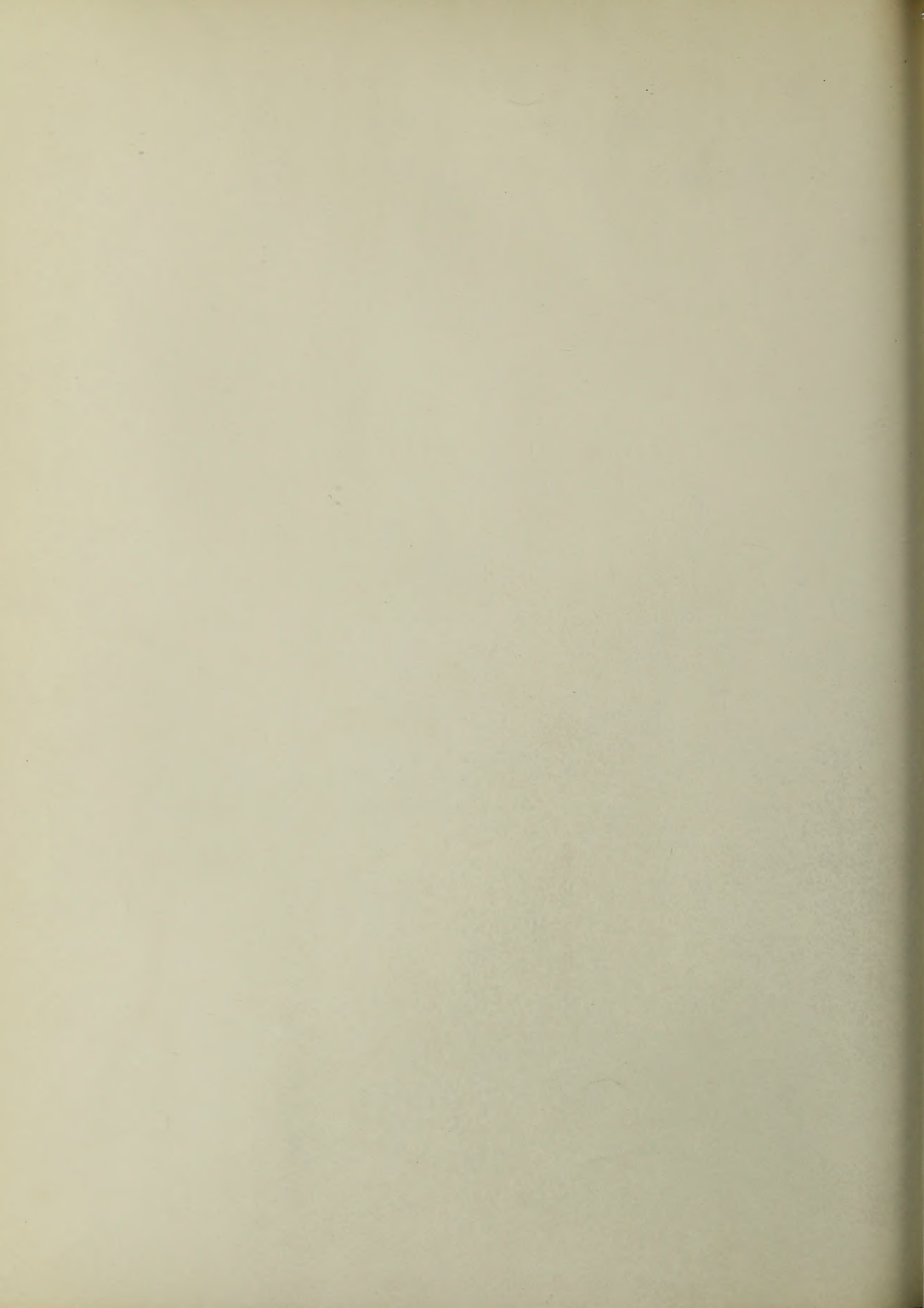
Cause

Card Figuration Incorrect

Correction

Card refigured and \$.61 added  
to premium for 3-5-50.

By Cost Dept.





rate for the job. Penalties for spoiled work act as strong incentives toward good quality. Premium only is penalized for the operator - his base wage for the job not being touched.

If an operator finds spoiled work as it comes to him for the next operation he stops work on it, reports it and gets the same point credit for the piece as he would had he completed the operation. There is no advantage in working on a spoiled piece and this method of rewarding makes an inspector out of every operator because he gets full value for the pieces with but little effort expended.

If a piece fails to pass inspection but can be saved by some additional work, the labor cost of that extra work is charged against the operator responsible for the defective piece. Re-operation penalties are helpful in reducing spoiled work because they too are a money loss to the operator.

Errors on the posting sheet, the daily record of operator's performance are called to the attention of the standards department by the checker on a special form. The operator's card is checked and if found incorrect the correction is made and the complaint slip returned to the checker with the correction indicated so that he can tell the operator.

The number of people a checker can handle will depend largely upon the nature of the operations he is checking. If they are of long duration he will not have to visit his men so often and can consequently handle more people; but if the operations are short and the operators shift around a great deal the checker will be decidedly limited in the number of people he can handle. The number of people checked





will vary from fifteen to sixty per checker in most plants.

There are many mechanical aids to help in the checking problem. Counters of all descriptions are used to determine revolutions per minute, number of strokes of various types of machines and number of feet of material passing through a given machine. The use of these devices is recommended because they aid in the accurate determination of numbers of pieces by taking the human factor out of the job.

Each checker is also provided with a base rate sheet which gives all the departmental operations and the corresponding base rates to use with them in accordance with the rules for their use, as indicated in the standard checkers' instructions.

The checking function has been explained in more or less detail because of its importance in any wage plan. The ultimate results will not be any more accurate than the original values posted on the cards. Nothing is more important in any wage plan than the accurate determination of a man's wage and a detailed record of the man's activity for the day is essential in order to do this.





CHAPTER X

THE POSTING SHEET





## THE POSTING SHEET

Under any incentive plan of wage payment it is desirable to let the operator know the amount of his premium earning as soon as possible after it has been determined by the cost department. The sole thing that spurs the operators on to higher production is the opportunity to earn a higher wage. A plant with a point system application notifies the men daily what their point hour and premium earning was for the previous day.

Each department has its own posting sheet and it is posted in a convenient place in the department. A reproduction of a posting sheet follows this chapter. The posting sheet is the daily record of each man's performance and shows the following items:

### HOURS WORKED

This is the total number of hours the operator spends in the factory.

### HOURS ON STANDARD

This shows the total number of hours the operator worked on the "Point System".

### POINTS

This figure is the total number of "POINTS" produced during the time the operator worked on the "Point System".

### POINT HOUR

The Point Hour is the average number of points produced by the





operator during the time he worked on the "Point System". This figure is found by dividing the total number of "Points" by the hours spent on Standards. Point Hours below 60, or Point Hours lower than the equivalent Point Hour for rates below the base rate, are shown in RED.

#### BAD WORK

Deductions are made here for bad work on which the operator has already received a premium.

#### PREMIUM

This shows the Premium earned for the day. It does not show the true premium of those operators whose rate is higher than the base rate as all premium is figured at the base rate. In a case of this kind the operator receives the higher wage of either his guaranteed earnings for the day or the base wage plus the premium.

Premium is earned only when an operator produces at better than a 60 Point Hour, or at better than his equivalent Point Hour if his rate is less than the base rate.

The operator can tell at a glance exactly what he earned the previous day when details of his previous day's production are fresh in his mind. If there are any misunderstandings they can be settled at once. There is also a valuable psychological advantage in posting the effectiveness of the workmen in a department as it stimulates a spirit of competition and rivalry among them.

The point hours listed on the sheet are a great aid to the foreman. Under the daywork plan of wage payment the foreman does not know the exact effectiveness of his men because he has no common measure to

operator during the time he worked on the "Point" system. This figure  
is found by dividing the total number of "Points" by the hours spent  
on "Point" work. Point work is defined as work done on the  
equivalent Point basis for work which the base rate, and shown in 17.

#### BASE RATE

Reductions are made from the base rate on which the operator has

already received a premium.

#### PREMIUM

This shows the premium earned for the day. It does not show the  
time premium of these operators when there is a day when the base  
rate as all premium is shown at the base rate. In a case of this  
kind the operator receives the highest wage of what has been earned  
everyday for the day or the base wage plus the premium.

Premium is earned only when an operator works on "Point" work.

At 60 Point Hour, or a better than the equivalent Point Hour, is 100

more is less than the base rate.

The operator can tell at a glance whether there is a day when the base

rate is less than the base rate of his previous day's production when he

his day. If there are any "Point" hours, then he is getting at

more. There is also a valuable psychological stimulus in getting

the effectiveness of his workman is a department as is illustrated a

spirit of competition and rivalry among them.

The point hour is based on the standard and a point is the base

and. Under the system plan of work payment the operator does not have

the exact effectiveness of his work because he has no change whatever to



apply to their production. He can, of course, go to past production records but this only gives the elapsed time for the job with the possibility of determining the number of pieces per hour. But there is no way from these records that he can compare one operator with another and if he is not living real close to the work he does not know what effort his men are putting into the job. The point hour reduces this individual to a common denominator, however, and he can tell every day just how his people are working.

Low point hours may mean one of several things. The following list suggests some of the possible difficulties.

1. Operator not effective on the work.
2. Wrong man for the job.
3. Trouble with the equipment.
4. Lack of work.
5. Wrong standard used.

Whatever the trouble, the foreman has a barometer of his department, which, if he uses rightly, will enable him to increase his operator's earnings, increase his supervision premium and decrease his labor costs.





## PREMIUM POSTING SHEET

DEPARTMENT

12

SECTION

WEEK ENDING 3-15-30.

No. 413. Pt. Hr. prev. Week NAME E. Gray.										No. 217. Pt. Hr. prev. Week NAME J. Lawrence.										No. 167. Pt. Hr. prev. Week NAME A. Hellman.										No. Pt. Hr. prev. Week NAME										No. Pt. Hr. prev. Week NAME									
DAY	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium														
Mon.	H	90	90	831		92	2.07	F	90	717	562		78	.84	G	90	792	759		96	1.92																												
Tues.	H	90	90	734		81	1.38	F	90	683	639		94	1.46	G	90	90	691		77	1.02																												
Wed.	H	90	90	803		89	1.07	F	90	667	540		81	.89	G	90	90	617		68	.52																												
Thurs.	H	90	90	733		82	1.37	F	90	639	445		70	.41	G	90	85	493		58	—																												
Fri.	H	90	90	808		90	1.91	F	90	525	454		86	.89	G	90	825	655		75	.88																												
Sat.																																																	
TOTAL																																																	
Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work																	
NET PREMIUM								NET PREMIUM								NET PREMIUM								NET PREMIUM								NET PREMIUM																	
Week earning								Week earning								Week earning								Week earning								Week earning																	
Pay								Pay								Pay								Pay								Pay																	

No. Pt. Hr. prev. week										No. Pt. Hr. prev. week										No. Pt. Hr. prev. week										No. Pt. Hr. prev. week										No. Pt. Hr. prev. week									
DAY	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium														
Mon.																																																	
Tues.																																																	
Wed.																																																	
Thurs.																																																	
Fri.																																																	
Sat.																																																	
TOTAL																																																	
Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work																	
NET PREMIUM								NET PREMIUM								NET PREMIUM								NET PREMIUM								NET PREMIUM																	
Week earning								Week earning								Week earning								Week earning								Week earning																	
Pay								Pay								Pay								Pay								Pay																	

No. Pt. Hr. prev. week										No. Pt. Hr. prev. week										No. Pt. Hr. prev. week										No. Pt. Hr. prev. week										No. Pt. Hr. prev. week									
DAY	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium	Rate	Hours	Hrs. on Stand	Poles	Bad Work	Pt. Hour	Premium														
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Fri.																																																	
Sat.																																																	
TOTAL																																																	
Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work								Deductions for Bad Work																	
NET PREMIUM								NET PREMIUM								NET PREMIUM								NET PREMIUM								NET PREMIUM																	
Week earning								Week earning								Week earning								Week earning								Week earning																	
Pay								Pay								Pay								Pay								Pay																	





## CHAPTER XI

### PAYROLL AND ACCOUNTING

#### PROCEDURE





## PAYROLL AND ACCOUNTING PROCEDURE

The basis for all payroll and cost figures is the checking cards. These cards should be so designed that they give the desired information in a form that is both complete and easy of interpretation. The latter quality is especially desirable, for all cards for a given day are figured the next day and the results made known on the department posting sheet on the afternoon of the day of figuration. Such procedure is quite different from most payroll computation where the problem is a weekly one.

It is essential that the staff of checkers in the factory who apply the information to the cards be most accurate in their work. The cards are the source of all labor records and wage earnings and for such reasons nothing should be spared to insure complete information regarding the daily work of every operator on standard. An illustration of a typical Bedaux time card is shown on the next page. Time cards will have to be designed to fit the particular condition that is to be checked. Special forms must be developed to handle such conditions as follows:

1. Power feed reciprocating machines where the number of strokes per piece machined will vary and where part of the handling time on the piece is done internal to the machining time.

2. Instances where an operator is operating several machines, each of which has M.A.A.













The particular forms necessary to check such conditions will not be gone into because they will vary with every application and the principle of figuration is the same as the one about to be explained.

A study of the card shows that the following information is given:

1. Operator's name, department number and date.
2. Time worked in the factory for the day.
3. Starting time of each job.
4. Stopping time of each job.
5. Elapsed time of each job.
6. Operation name and specification of piece being worked on.
7. Machine speeds and feeds.
8. Number of pieces completed.
9. Point standard for each piece.
10. M.A.A. standard if any.
11. Labor classification.
12. Base rate of job.

On some applications the standards that are posted on the cards by the checker are checked by the standards department every day before the cards are turned over to the cost department for figuration. This practice is recommended where the standards applied per card are small, but, on applications where each card has twenty or thirty entries, it is not practical to check every standard because it would entail excessive clerical work and cause delay. On such applications the checking staff should be trained and required to work accurately. Mistakes should be prevented and not corrected. The time cards should be looked over daily





before figuration to check omissions and possible rate errors. After checking the cards they are turned over to the cost department for figuration.

To aid in the explanation of card figuration, reference is made to the time card shown. The print shows both sides of a card that is very common on Bedaux applications. The card comes to the cost department with all the necessary information and is figured as follows:

1. The operator's total working time is obtained from his in and out time on his clock card and posted on the card as indicated.

Total - 540 minutes.

2. Time credits are next totalled for work that is not done on standard. This will include such items as day work, set up, maintenance, interference beyond the control of the operator.

Total - 95 minutes.

3. The difference between the time worked and the time credits is entered on the card as "Minutes on Standard".

Total - 445 minutes.

4. The minutes on standard are converted into hours on standard by dividing by 60. This gives the hours that the operator was on standard.

Total - 7.42 hours.

5. The card is next studied for labor classifications to be used later in the distribution.





The number of pieces of each entry is multiplied by the point standard for the operation and the total points for each classification entered on the card. The day work items are entered under time credits.

In this case these values are:

Maintenance	-	20 points
Knife Line	-	530 points
Total	-	550 points

6. The sum of the points in all classifications is entered under points and the operator's point hour found by dividing the total points by the hours on standard.

$$\frac{550}{7.42} = 74 \text{ Point Hour}$$

7. The number of premium points earned is found by subtracting the minutes on standard from the total points earned.

Points Premium - 105

8. The cost of a point under the Bedaux system is equal to the base rate divided by 60. Premium paid the operator is dependent upon the base rate he is working on. He is paid 75% of this point value, the other 25% going into a fund for distribution to supervision.

Premium for the direct operators is calculated as follows:

$$\text{Premium} = \frac{\text{Points Premium} \times \text{Base Rate}}{60} \times .75$$

Substituting figures from card:





$$\text{Premium} = \frac{105 \times 54}{60} \times .75 = \$ .71$$

9. The undivided portion is one third of the direct operators' premium, as stated above. The operator gets three quarters of the premium and the other one quarter goes into a fund from which the indirect labor is paid a premium.

$$1/3 \text{ of } \$ .71 = \$ .24$$

10. The operator's hourly wage is equal to the base rate times the number of hours worked.

$$\$ .54 \times 9 = \$4.86$$

11. The total standard cost is the sum of the base wage plus the direct premium plus the undivided premium.

$$\$4.86 + \$ .71 + \$ .24 = \$5.81$$

12. The operator's total pay for the day is equal to the sum of his base wage plus the direct premium.

$$\$4.86 + \$ .71 = \$5.57$$

A plot showing the relationship of normal day wage to the percentage of normal production under the Bedaux point system is given on the following page. A study of this curve shows that the wage is constant up to one hundred percent of normal production. In other words, the operator receives the base wage of the job for his premium determination regardless of his point hour. Above the normal point the slope of the curve indicates the increasing rate of his earning as his percentage of normal production increases. As this curve is a straight



$$100 \times \frac{100}{100} = 100$$

9. The undivided portion is one third of the direct question.

question, as stated above. The operator gives three quarters of the premium and the other one quarter goes into a fund from which the direct labor is paid a premium.

$$100 \times \frac{100}{100} = 100$$

10. The operator's weekly wage is equal to the base rate less the number of hours worked.

$$100 \times \frac{100}{100} = 100$$

11. The total standard cost is the sum of the base wage plus the direct question plus the undivided question.

$$100 \times \frac{100}{100} + 100 \times \frac{100}{100} = 200$$

12. The operator's total pay for the day is equal to the sum of the base wage plus the direct question.

$$100 \times \frac{100}{100} + 100 \times \frac{100}{100} = 200$$

A plot showing the relationship of normal day wage to the percentage of normal production under the bonus point system is given in the following table. A copy of this curve shows that the wage is constant up to one hundred percent of normal production. In other words, the operator receives the base wage of \$100 for his normal day's work. Above this point, however, the wage rises in proportion to the percentage of normal production. As this curve is a straight

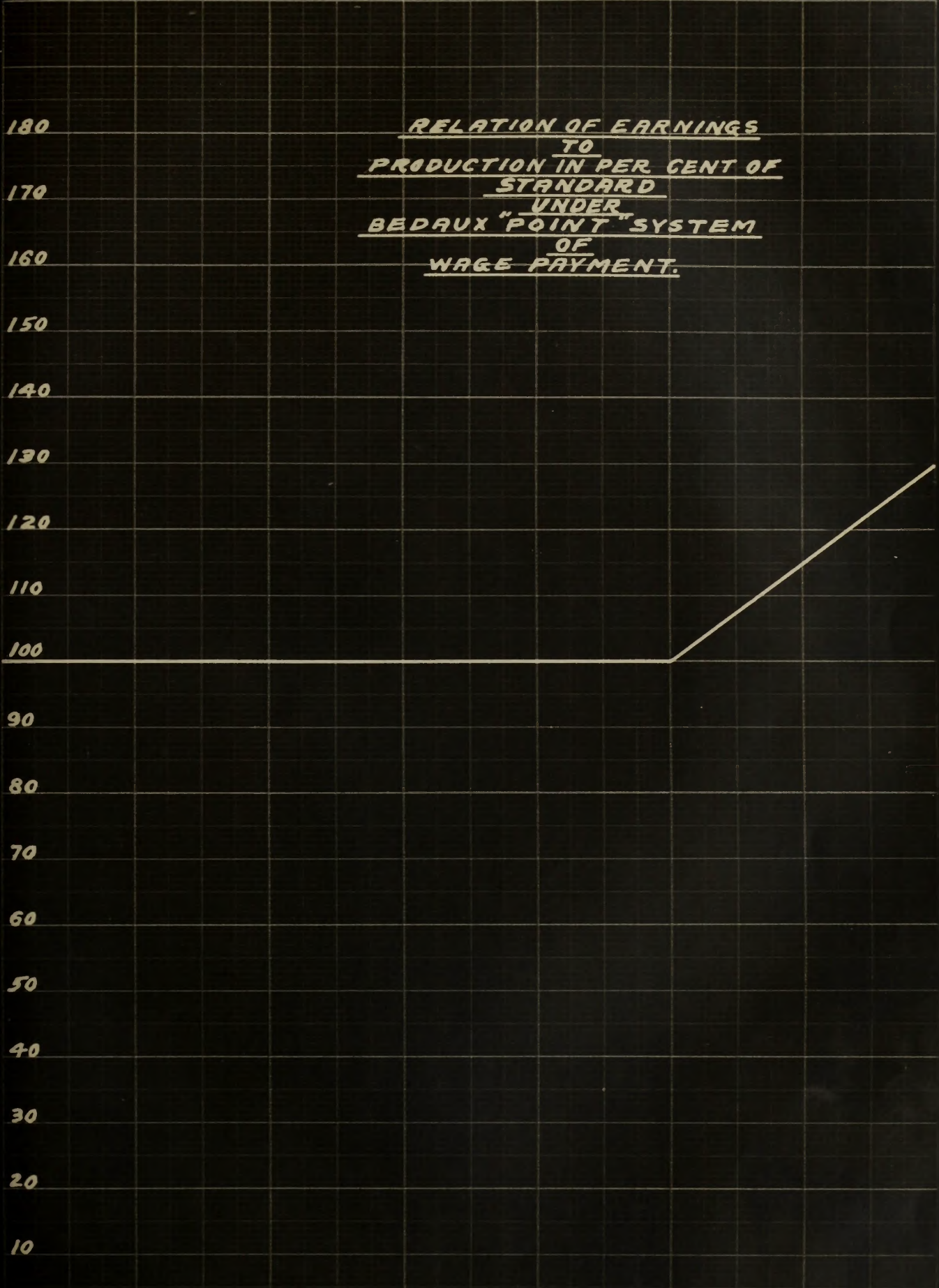


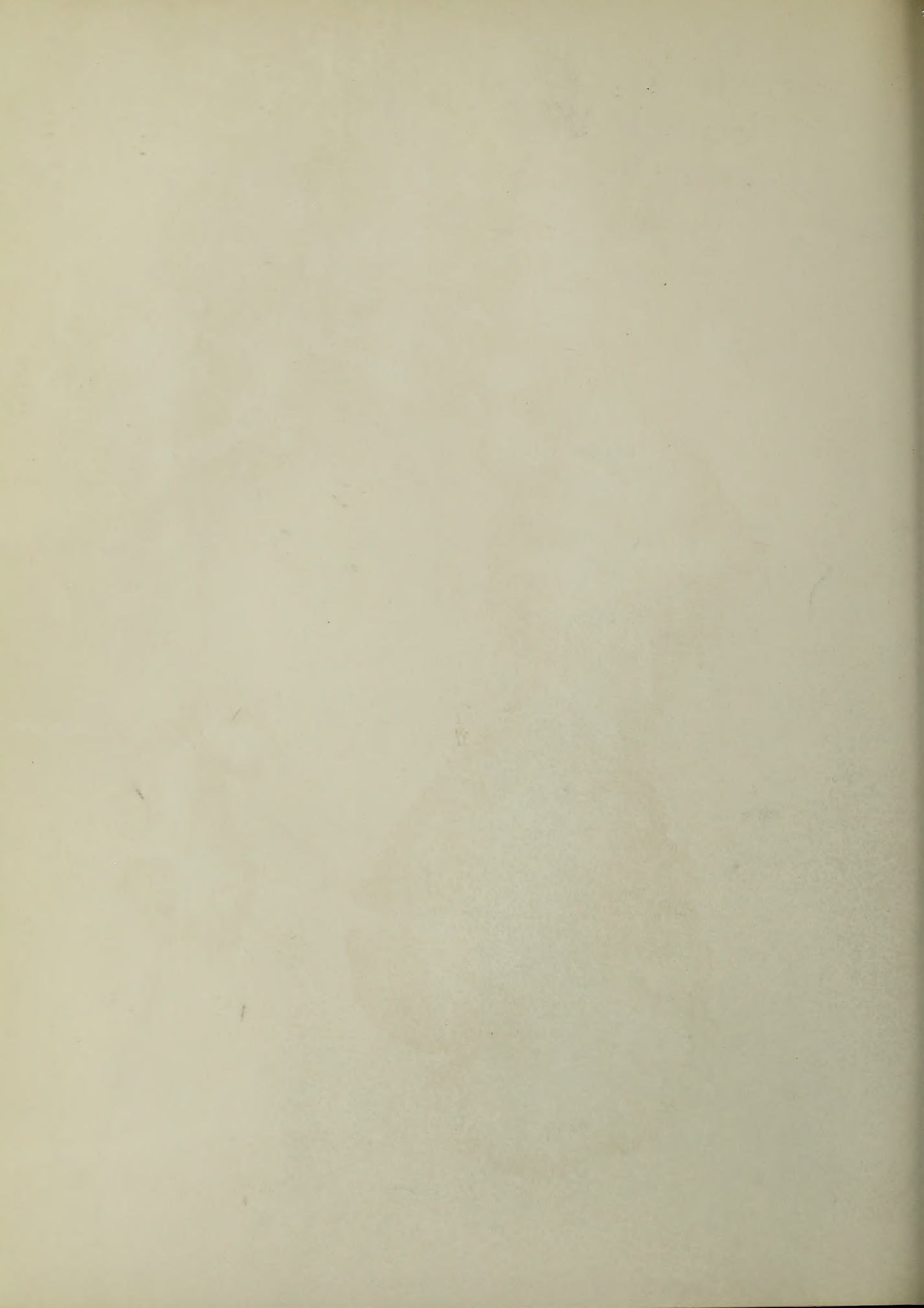
RELATION OF EARNINGS  
TO  
PRODUCTION IN PER CENT OF  
STANDARD  
UNDER  
BEDAUX "POINT" SYSTEM  
OF  
WAGE PAYMENT.

PERCENTAGE OF NORMAL DAY WAGE

180  
170  
160  
150  
140  
130  
120  
110  
100  
90  
80  
70  
60  
50  
40  
30  
20  
10

10 20 30 40 50 60 70 80 90 100 110 120 130 140  
PERCENTAGE OF NORMAL PRODUCTION







line variation it is evident that his premium earning is entirely dependent upon his point earning.

The figuration of time cards is the first step in the payroll and accounting procedure. The next step is the listing of the hours worked, hours on standard, points earned, point hour, and premium earned on the posting sheet. This was explained in detail in the previous chapter.

All checking cards are next sorted by rates and entered on a daily work sheet. The total money is then accumulated from all cards and noted on the work sheet. In the same way the total hours on standard is noted on the sheet. A print of this sheet follows this page. A daily work sheet of this type is made out for every department. This work sheet has headings which make possible a daily analysis and accumulation of all points on standard and all day work hours for the groupings indicated. These accumulated figures later serve as the source for the data used in figuring the weekly analysis sheet. The entries on the daily work sheet are in points and corresponding base rates under the items on standard, and in minutes and corresponding operator's rate under the items on day work. Along with the time and point entries, with their corresponding base rates, there is also listed a symbol which will facilitate the accumulation of costs by lines in a later analysis. This will not be gone into here because it is a procedure which is peculiar to the application being described only.

After the items on the cards for the department for the day have been listed, totals are derived for the number of points and the corres-





1	2	3	4	5	7	10	11	12	13	14	15	16	17	18	19	30	31	32	33	34	35	36	6	9
POINTS.	SU.	MAINT+REPR ON STD.				D.W.	S.O.W.	R.O.D.	S.U.	MN. O.D.		W.	B.D.	R.T.D.		M. A.L.	SUPER.	CLK.	INSP.	H	MN.	S.O.	R/C	
PRODUCTION ON STANDARD	SET-UP ON STANDARD.	THIS DEPT.	MISC. INDIRECT ON STANDARD	HOURS ON STANDARD	PRODUCTION WITHOUT STANDARD	ONE DAY WORK RE-OPERATING A/C. OTHER DEPTS	SET-UPS WITHOUT STANDARD	MAINT+REP OTHER DEPTS NOT ON STAND	POINTS TO EQUAL STANDARD		WAITING	BREAK-DOWN	RE-OPERATION A/C THIS DEPT.	M.A.A.	MISC. ALLOWED TIME.	SUPER- VISION	CLERK- SHIP	INSPECTION	HANDLING	MAINT + REPAIR FOR THIS DEPT.	SHUT DOWN	REJECT CREDITS	ADJ. TO INDIRECT.	

755-K-39	161-51	6-42	Handling	238-67	180-K-48	275-K-54	45-51	20-51	49-39	50-51	55-K-54	631-38	40-38	540-75	714-22	540-69	30-30	20-29
375-K-42	685-54	300-51	250-39		140-C-51		170-54	30-14	278-51	30-54		1095-51	40-51		1485-50		540-50	45-50
4067-K-51	61-57	717-54	60-54		1105-K-51			55-54	127-54			1236-54	30-54		10-57		105-51	105-54
16-S-54		56-57			70-S-51								50-57					
1404-K-54					160-S-54													
1112-K-57					825-K-54													

MN 93-7 Clerical  
100-54 4-51  
61-54

P - 11 - 30

MN 41  
65-51  
65-54

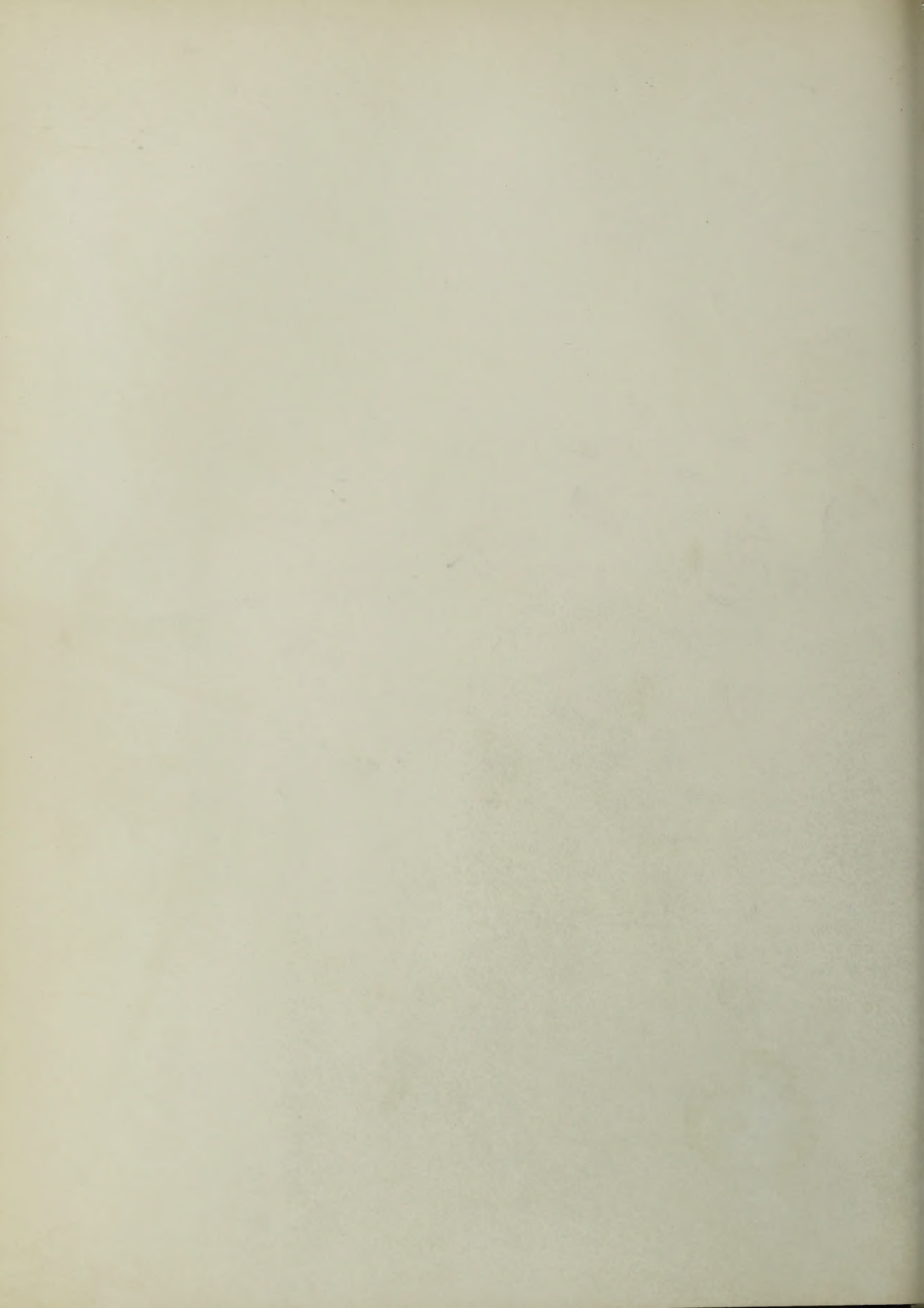
	Points																							
Time		1079	290																					
18778	907	100	65		2428	275	215	75	564		80	55	2964	160	540	1709	540	675						
Money																								
146.00	8.11	9.58	2.68																					
		00	58		71.55	5.48	1.91	67	4.81		70	50	24.43	1.34	6.75	13.64	6.21	5.58						

#### Money Check

Time Cards \$261.87  
Work Sheet \$261.91  
Difference .04

#### Time Credits Check

Time Cards 10076  
Work Sheet 10076  
Posting Sheet 10076





ponding money value and the number of minutes and their corresponding money value. The next step is to post these totals on a daily analysis sheet, shown on the next page. This sheet gives the classification, the total number of points or minutes under each classification and the corresponding money value. At the end of each week the daily analysis sheets are totalled and this weekly summary becomes the basis for the figuration of the weekly analysis, as discussed in detail in Chapter thirteen.

There are several checks made throughout the procedure first mentioned to insure accuracy. The total hours on standard, as listed on the daily work sheets, are checked against the hours on standard listed on the posting sheets. The total points are checked in like manner. The day work listed on the work sheet is checked by deducting the hours on standard from the total time worked in the department.

The posting sheets are used to make up the factory payroll. At the end of the week the operator's earnings are totalled and if he has no guaranteed rate the base wage plus the premium is his weekly earning. If he has a guaranteed rate and his base pay plus the premium does not amount to the guaranteed weekly pay, he is paid the guaranteed rate and the difference is charged to excess cost and added to the burden of the department.

The sheets next go to the payroll clerk and the information transcribed to the operator's clock cards. The clock cards now become the master records for making up the payroll.

Supervision premium is paid from the fund accumulated from the



providing money value and the number of minutes and their corresponding money value. The next step is to post these totals on a daily analysis sheet, shown on the next page. This sheet gives the classification, the total number of points or minutes under each classification and the corresponding money value. At the end of each week the daily analysis sheets are totaled and this weekly summary becomes the basis for the preparation of the weekly analysis, as discussed in detail in Chapter thirteen.

There are several checks made throughout the procedure that are mentioned in future chapters. The first check is made, as stated, on the daily work sheets, and checked against the hours as stated listed on the positive sheets. The total points are checked in this manner. The day work listed on the work sheet is checked by totaling the hours on standard from the total time worked in the department.

The positive sheets are used to make up the factory payroll. At the end of the week the operator's earnings are totaled and if he has no guaranteed rate the base wage plus the amount of his weekly earnings. If he has a guaranteed rate and his base pay plus the premium does not amount to the guaranteed weekly pay, he is paid the guaranteed rate and the difference is charged to excess cost and added to the burden of the department.

The sheets sent to the payroll clerk and the information transmitted to the operator's check book. The check book now becomes the source records for making up the payroll.

Supervision premium is paid from the fund accumulated from the



Dept. 7		DAILY ANALYSIS				Date 2-11-30																		
Form 91	Classification	Pts. or Min.				Hrs.				Value														
1	Production on Standard	1	6	7	7	8							\$	1	4	6	9	0						
2	Set up on Standard			9	0	7											8	1	1					
3	Maint. this Dept. on Std.			1	0	7	9											9	5	8				
4	“ other “ “ “			1	0	0													9	0				
5	Misc. Indirect on Standard			4	5	5													3	2	6			
6	Rejection Credits																							
7	Hours on Standard								2	3	8	6	3											
10	Production without Standards			2	4	8	8				4	1	4	7						2	1	5	5	
11	Special Day Work			2	7	5					4	5	8							2	4	8		
12	Re-op. acct. Other Dept.																							
13	Set up without Standard			2	1	5					3	5	8							1	9	1		
14	Mn. Other Depts. without Std.				7	5					1	2	5								6	7		
15	Points to equal Standard			5	6	4															4	8	1	
16	Waiting				8	0					1	3	3								7	0		
17	Breakdown																							
18	Re-op Acct. this Dept.				5	5						9	2								5	0		
19	M. A. A.			2	9	6	4				4	9	4	0							2	4	4	3
30	Misc. Allowed			1	6	0						2	6	7							1	3	4	
31	Supervision			5	4	0						9	0	0							6	7	5	
32	Clerkship			1	7	0	9					2	8	4	8						1	3	6	4
33	Inspection			5	4	0						9	0	0							6	2	1	
34	Handling			6	7	5					1	1	2	5							5	5	8	
35	Maint. this Dept.			3	0	0						5	0	0							2	5	9	
36	Shut Down																							
9	Adjustment to Indirect																							
8																								
37																								





direct premium. The amount of this reward is proportional to the difference between the supervision point hour and the base for supervision premium as listed on the weekly analysis sheet. This premium is distributed monthly, while the direct premium is paid on a weekly basis.

Supervision premium would be calculated in the following manner for a four week period:

Week	Supervision "Point" Hour	Base for Supervision Premium	Premium "Points"
1	72	60	12
2	74	60	14
3	74	60	14
4	73	60	13

The supervision premium paid the foreman of the department earning the above premium points for a period of a month would be calculated as follows:

Week	Hours on Supervision	Total Premium Points for Week
1	50	$50 \times 12 = 600$
2	50	$50 \times 14 = 700$
3	50	$50 \times 14 = 700$
4	50	$50 \times 13 = 650$

Total premium points = 2650

Money value per 100 points = \$1.14

Total premium for month =  $26.5 \times \$1.13 = \$30.00$





This chapter gives a suggested procedure to be followed in determining point system costs. The exact nature of the accounting detail necessary will have to depend upon the nature and characteristics of the particular industry in which the application is being made.





## STANDARD INDIRECT COSTS





## STANDARD INDIRECT COSTS

The standard by which the effectiveness of a department is measured is the proximity of the actual cost to produce 1000 points to the standard or theoretical cost to produce 1000 points. To measure the extent that actual conditions approach standard conditions in any department it is necessary to determine a standard cost for the indirect labor per 1000 points produced in the department.

In determining this value it is necessary to determine how many direct workers each of the indirect workers can serve. This information can be determined by any of the three following methods:

1. Time study.
2. Judgment.
3. Past performance.

### Use of Time Study.

Time study is perhaps the most accurate method of determining the ratio of productive workers that should be served by each non-productive man. This study should cover a period of several days and while one indirect worker is being studied it is also possible to study several others to a certain degree. A time for the study should be selected when conditions in the department are about normal. By this is meant when the average amount of productive and non-productive work is being done. Such a condition is particularly desirable because the studies taken on these days are taken as representative for the week or month. After the studies have been taken it is possible to analyze





them and determine the standard ratios of direct labor to indirect labor for the department.

#### Use of Judgment.

When using this method of standard indirect cost determination the standard cost per 1000 points is set up for an imaginary department. The following example will illustrate the procedure in setting up the standard indirect by this method.

#### Supervisory Force in the Department

1 Foreman	\$40.00 per week
1 Assistant Foreman	30.00 " "
1 Clerk	20.00 " "
1 Maintenance Man	30.00 " "
1 Trucker or Handler	<u>20.00</u> " "
Total Cost	\$140.00 per week

In consultation with the plant superintendent, department head, and the standards department it is estimated that this supervisory force on this type of work and under normal conditions could perform the indirect labor for a force of fifty direct operators.

Fifty operators working at 60 points an hour for 48 hours will produce  $50 \times 60 \times 48 = 144,000$  points.

A total of 144,000 points on standard costs \$140 for indirect labor. Therefore, every point on standard costs  $\frac{\$140}{144,000} = \$.001$

for indirect labor. That is, the standard indirect cost per point on standard is equal to \$.001 and the cost per 1000 points will be \$1.00.





This method is much used and is a satisfactory way to set up the standard indirect cost.

#### Use of Past Performance.

In the use of this method of determination it is necessary that a record for a reasonable period be obtained, preferably after standards have been applied in the department.

The figures compiled indicate exactly what the indirect costs have been. It is next necessary to rate these conditions to give a cost figure as to what they should be after a complete study of the indirect force in the department has been made. The analysis on the next sheet will show the method of determining the standard indirect cost on a basis of past performance.





# FIGURATION OF STANDARD INDIRECT

FOR DEPT. 64

Based on 10 weeks figures

Week Ending	Super.	Clerkship	Inspection	Handling	Maintenance	S.U. on Std.	S.U. on D.W.	No. Direct Operators	No. Indirect Operators
9-21-29	50.00	29.42	-	85.34	19.09	300 pts.	.88	3.3	3.8
9-28	50.00	26.58	-	59.32	8.33	474	1.33	4.5	3.0
10-5	50.00	25.00	-	71.42	11.75	338	3.84	4.2	3.3
10-12	50.00	22.50	-	54.17	13.76	197	1.25	3.6	2.9
10-19	55.33	25.00	1.17	71.63	15.31	368	.83	3.9	3.5
10-26	50.00	25.00	-	65.66	7.08	371	.50	3.9	3.0
11-2	50.17	25.50	.25	67.42	6.58	390	1.72	3.9	3.1
11-9	52.48	25.00	-	75.16	10.75	459	2.50	4.1	3.5
11-16	45.50	16.00	-	54.83	10.00	374	-	3.5	2.6
11-23	50.00	24.75	-	63.42	9.83	341	1.33	3.8	3.1
Total	503.48	244.75	-	668.37	112.48	3612	14.18	38.7	31.8
Weekly Av.	50.4	24.5	-	66.8	11.3	361 pts.	1.4	3.87	3.18

@ 60 Pt. Hr.  
= 6.0

	Actual	Rate	Std. Hrs.	Rate	Cost
Supervision	50.4	45	37.0	.75	\$27.80
Clerkship	24.5	60	24.5	.40	9.80
Inspection	-	-	-	-	-
Handling	50.0	45	37.6	.51	19.20
Maintenance	16.3	60	16.8	.39	6.55
	11.3	60	11.3	.51	5.76
S.U. on Std.	6.0	60	6.0	.51	3.06
S.U. on D.W.	1.4	60	1.4	.51	.71
			134.6		\$72.88

Total Equiv. Oper. 7.0  
Indirect Oper. 2.7  
Total Direct Oper. 4.3

4.3 x 60 x 50 = 12,900

Std. Ind. Cost/1000 =  $\frac{\$72.88}{12.9}$  = \$5.65/1000 pts





Any increase in indirect costs over those allowed for in the standard figure set up will unbalance the ratio of direct to indirect. This unbalancing may be brought about in either of the following two ways:

1. Additions to the indirect personnel without a proportionate increase in the production on standard.

2. A reduction of the production on standard with the maintenance of the existing supervisory force.

Either of the above conditions will effect a variation in the standard ratios and in turn affect the premium paid to the indirect workers. It is therefore decidedly to the advantage of the indirect staff to have the department operate with less than the standard indirect allowed for and thus make possible an increase in the indirect premium.





## CHAPTER XIII

### THE ANALYSIS SHEET





## THE ANALYSIS SHEET

The daily payment records of the operators including "points" earned on standard, allowances and a division of the departmental indirect hours are totalled and costed in the form of a weekly analysis sheet. Some applications use a daily analysis sheet but from a practical standpoint the weekly sheet gives good results and the elimination of the daily sheet saves a good deal of extra clerical work. A sample analysis from an actual application is shown at the conclusion of this chapter and will be referred to constantly during the explanation of the sheet.

The upper half of both sections of the sheet concerns itself with time values alone, while the lower half of both sheets is the monetary representation of the time items indicated on the upper half. The lower half is a complete labor cost analysis of the department for the week.

The purpose of the analysis sheet is to present to the management a picture of the operating efficiency of each department for every week. The standard by which this efficiency is measured is the proximity of the actual cost of producing a "point" on standard to the theoretical cost. The development of this ratio of proximity will be indicated later.

In order to get a clear picture of the values indicated on the sheet and the relationships which govern their determination an analysis will be given of how each item on the sheet is calculated. A





study of these will reveal the possibilities of control with this data at hand weekly. The basis for the information is, of course, the cards made out by the Bedaux checker in the factory. A complete list of all analysis sheet items, the source of the information for each determination and the method of calculation is given below. For the sake of clarity the reference source is the analysis given for the first week on the sample sheet shown. This refers to the first line of data on both sheets and on both the upper and lower sections.

Equivalent Number of Employees.

1. Direct.

This figure represents the number of full time direct workers employed for the weekly period. It is obtained by dividing the sum of "Regular Production", plus "Special Work", plus "Net Total Productive Points", divided by the "Operator's Point Hour", plus "Total Hours Allowed"; this entire amount divided by 50, or the standard number of working hours in the period of one week.

$$\frac{357.6 + 46.8 + \frac{(98311)}{82} + 111.5}{50} = 34.3$$

2. Indirect.

This figure represents the number of full time indirect workers employed for the weekly period. It is obtained by dividing the sum of "Set Ups", "Maintenance And Repair This Department", "Maintenance And Repair Other Departments" - these three items all on standard, by the "Operator's Point Hour" plus "Set Ups", "Maintenance And Repair Other Departments" on day work, plus "Total Hours Indirect", under "Indirect Hours". This entire value is divided by 50, the





standard number of working hours in the period.

$$\frac{(5305 + 3433 + 590)}{50} + 52.02 + 8.3 = 9.9$$

Work on Standard - "Points".

1. Productive "Points".

This is the sum of all the "points" produced by the direct operators on regular product. It is obtained by summarizing the productive "points" on all checking cards.

Total "Productive Points" equals 98311.

2. Deduct for Bad Work.

This represents the "points" deducted in the department for bad work. This total is taken from the lost reports.

Total Deduction - 0.

3. Miscellaneous Indirect.

This represents what indirect work is on standard.

Miscellaneous Indirect - 702 points.

4. Set-Ups.

Set-ups on standard are totalled from the checking cards and entered here.

Set-Ups equal 5303 points.

5. Maintenance and Repair This Department.

This is obtained from the checking cards.

Total Points equal 3433





6. Maintenance and Repair Other Departments.

Obtained the same as 4 and 5.

Total Points equal 590.

7. Total "Points".

This is the sum of all the "points" produced for the week.

Total Points equal 108,341.

Total Hours on Standard.

1. This figure represents the total number of hours spent by the operators in the department working on standard. It is obtained from a summary of the checking cards.

Total Hours on Standard equal 1321.47.

Operator's "Point" Hour.

1. This figure is the average rate at which all "points" were produced. The "point hour" is obtained by dividing the Total "Points" by the "Total Hours on Standard".

$$\frac{108341}{1321.47} = 82.0 \text{ Operator's "Point" Hour.}$$

Work Without Standards - Hours.

1. Regular Production.

This is the regular production done on day work and comes from the checking cards.

Total - 357.6 hours.

2. Special Work.





This item covers work which ordinarily cannot be put on standard or experimental work on production. The information comes from the checking cards.

Total - 46.88

3. Reoperation on Account of Other Departments.

This is considered as productive work for this department and comes from the checking card.

Total - 0

4. Total Productive Hours.

This is the sum of 1, 2, and 3, and is equal to 404.48.

5. Set-Ups.

This is the total time spent by the operators of the department on set-ups on day work and the data comes from the checking cards.

Total - 52.05

6. Maintenance and Repair Other Departments.

This comes from the checking cards and is handled the same as item 3.

Total - 8.33

7. Total Expense Hours.

This is the sum of items 5 and 6.

Total - 60.35





### 8. Total Hours.

This is the sum of items 4 and 7.

#### Points to Equal Standard.

1. When an operator produces at less than a 60 "point hour" he is paid the base wage for the job, which is the wage for a 60 "point hour". The difference between 60 "points" per hour and the operator's actual "point hour" is charged to "Points to Equal Standard". This item is obtained from the checking cards of those operators who were below standard in their "point" earning.

Total - 571

#### Rejects Credits.

1. Imperfect pieces of work are found by operators and they are credited to the operator at the full "point" value of his particular operation. This section of the analysis sheet gives the total of all such rejection credits.

Total - 5

#### Allowed Hours.

##### 1. Waiting.

This figure represents the actual time, in hours, lost by operators of the department in waiting for work. The cause of this delay is beyond the control of the operators themselves. The data is obtained from the checking cards.

Total - 3.0

##### 2. Breakdown.





The figure in this column represents the actual time, in hours, lost by the operators of the department in waiting because of breakdown time. This time is beyond the control of the operators. The figures come from the checking cards.

Total - 0

3. Reoperation on Account of This Department.

This column represents the actual time, in hours, spent by the workers of the department and comes from the checking cards.

Total - 0

4. M.A.A. (Machine Assignment Allowance).

This is the total time that all machines are under power feed and not requiring the attention of the operator for the actual operation. The data comes from the checking cards.

Total - 78.68

5. Miscellaneous.

This figure represents all time lost by operators in this department for causes other than those noted in the four preceding items. It may include such items as lunch allowances for overtime work, etc. The data is from the checking cards.

Total - 29.84

6. Total Hours Allowed.

This total is the sum of all the preceding items in the section of "Allowed Hours".

Total - 111.52





Total Hours (On Standard and Allowed).

1. This figure is the sum of "Total Hours on Standard" and "Total Hours Allowed".

$$\text{Total} = 1321.47 + 111.52 = 1432.99$$

Department "Point" Hour.

1. This figure represents the rate of "point" earning for the whole department. It is obtained by dividing the "Total Points" by the "Total Hours (On Standard and Allowed)".

$$\frac{108341}{1432.99} = 75.6$$

Indirect Hours.

1. Supervision.

This figure gives the total hours of supervision in the department and is obtained from the checking cards.

$$\text{Total} - 68.84$$

2. Clerkship.

This figure indicates the hours of clerical work in the department and consists mainly of the departmental checker's time. The data is obtained from the checking cards.

$$\text{Total} - 66.17$$

3. Inspection.

This column gives the total hours spent on inspection in the department and is obtained from the checking cards.

$$\begin{array}{r} \text{Total} - 90.83 \\ - 95 - \end{array}$$





#### 4. Handling.

The figure in this column is the total hours for the week spent in handling of the product. The data is obtained from the checking cards.

Total - 44.79

#### 5. Maintenance.

This figure gives the total hours spent in maintenance in the department and is obtained from the checking cards.

Total - 43.79

#### 6. Shutdown.

This figure gives the hours that operators were paid for but during which they did not work. This data is obtained from the checking cards.

Total - 0

#### 7. Total Hours Indirect.

This figure is the sum of all the items under "Indirect Hours".

Total - 314.42





Following is the method of determination of the values listed on the lower half of both sheets. As was mentioned before, this section of the sheets is the monetary representation of the time values listed on the upper half of the sheets. In addition, a summary is given which leads to the development of the operating ratios which measure the effectiveness of the department supervision.

Total Payroll.

1. This figure is the total amount of money to all operators in the department. It is obtained by adding the following items:

(a) Total under "Work Without Standards"	\$261.38
(b) Total under "Standard Point Payroll"	\$889.90
(c) "Actual Indirect Payroll"	\$203.71
(d) Total under "Excess Cost Over Standard "Point" Payroll	<u>\$ 59.54</u>
	\$1414.53

Work Without Standards.

1. Productive.

This item is the cost of "Regular Production" done on day work. This value comes from the checking cards.

Total - \$229.32

2. Non-Productive for This Department.

This is the cost of "Set-Ups" under the "Work Without Standards". It is obtained from the checking cards.

Total - \$28.12

3. Non-Productive for Other Departments.





This value is the cost of "Reoperations on Account of Other Departments" and "Maintenance and Repair Other Departments". Both of these items are under the "Work Without Standards".

Total - \$3.94

#### 4. Total.

This value is the sum of items 1, 2, and 3.

$$\text{Total} = 229.32 + 28.12 + 3.94 = \$261.38$$

#### Total "Point" Payroll.

1. This figure is the total cost of all productive "points" produced in this department plus their proportionate share of the non-productive cost. It is calculated as follows:

"Actual	+	<u>Actual Point Payroll</u>	x	Sum of	(	1. Actual Indirect Payroll
Point		Actual Pt. + Productive			(	2. Non-Productive "Without Std."
Payroll"		Payroll Work Without			(	This Dept.
		Standards			(	Other Depts.
					(	3. Non-Productive "On Stds."
					(	This Dept.
					(	Other Depts.

#### Substitution of Figures.

$$\begin{aligned}
 & 867.09 + \left( \frac{867.09}{867.09 + 229.32} \right) \times \begin{pmatrix} 203.71 \\ 28.12 \\ 3.94 \\ 77.30 \\ 5.05 \end{pmatrix} \\
 &= 867.09 + .792 (318.12) \\
 &= 867.09 + 251.51 \\
 &= 1118.60
 \end{aligned}$$

#### Actual Point Payroll.

1. This figure is the sum of "Productive" labor under "Standard





Point Payroll" and "Total" under "Excess Cost Over Standard Point Payroll".

$$\text{Total} = \$807.55 + \$59.54 = \$867.09$$

Standard Point Payroll.

1. Productive.

This figure comes from the checking cards.

$$\text{Total} - 807.55$$

2. Non-Productive for This Department.

This is the cost on standard, of "Set-Ups" and "Maintenance and Repair This Department". This data comes from the checking cards.

$$\text{Total} - 77.30$$

3. Non-Productive for Other Departments.

This is the cost, on standard, of "Maintenance and Repair Other Departments".

$$\text{Total} - 5.05$$

4. Total.

This is the total of items 1, 2, and 3.

$$\text{Total} = \$807.55 + 77.30 + 5.05 = \$889.90$$

Actual Indirect Payroll.

1. This is the cost of "Total Hours Indirect" under "Indirect Hours" and is obtained from the checking cards.

$$\text{Total} - \$203.71$$





### Standard Indirect Payroll.

1. Not used on this particular application, but would be the standard cost of the indirect for the department.

### Excess Cost Over Standard "Point" Payroll.

1. Charged by Other Departments.

This is a transfer account which is not in use on this particular application. It would be obtained from checking cards and charged as an excess cost to the department having work done in some other department.

2. M.A.A. (Machine Assignment Allowance.)

This is the cost of M.A.A. under "Allowed Hours" and is obtained from the checking cards.

Total - \$37.70

3. Reoperation This Department.

This is the cost of work done over by this department. It comes from the hours indicated by this item under the "Allowed Hours".

Total - 0

4. Non-Productive.

This figure is the total cost of the following items:

(a) Points to Equal Standard.

(b) Breakdown.

(c) Miscellaneous.

Total - 21.84

5. Adjustments.





This figure is the difference between guaranteed pay and premium pay and it comes from the checking cards.

Total - 0

6. Total.

This is the sum of items 2, 3, 4, and 5.

Total - 59.54

7. Per Cent.

This is percent of excess cost over "Total Standard Cost".

$$\text{Per Cent} = \frac{59.54}{889.90} = 6 \%$$

Rejects Cost.

1. This figure is the cost of all false rejects and is charged to inspection.

Departmental Distribution.

1. This is a special set of values for this application but not in use as yet.

Cost per 1000 "Points".

1. Actual Direct.

This is equal to the Actual "Point" Payroll divided by the Total Productive "Points".

$$\frac{\$867.09}{98311} = \$8.81$$

2. Standard Direct.





This is equal to "Productive" under "Standard "Point" Payroll" divided by "Total Productive "Points".

$$\frac{\$807.55}{98311} = \$8.21$$

### 3. Actual Indirect.

This figure is a proportionate part of the "Total Indirect Cost" which must be applied against the "Productive" work under "Standard "Point" Payroll". It is calculated as follows:

1000 x	<u>Actual Point Payroll</u>	x	(1. Actual Indirect Payroll
	<u>Actual Pt. + Productive</u>	(	(2. Non-Productive Without Stds.
	<u>Payroll</u>	(	This Department
	<u>Work Without</u>	(	Other Departments
	<u>Standards</u>	(	(3. Non-Productive on Standard
		(	This Department
		(	Other Departments

---

Total Productive "Points"

### Substitution of Figures.

1000 x	<u>867.09</u>	x	(203.71)
	<u>867.09 + 229.32</u>	(	( 28.12)
		(	( 3.94)
		(	( 77.30)
		(	( 5.05)

---

98311

$$= \frac{1000 \times .79 \times 318.12}{98311} = 2.56$$

### 4. Standard Indirect.

A constant figure set up from an analysis of the department. A separate chapter gives in detail the method used in setting up this value.

This figure is in this case \$3.10





5. Actual Total.

This value is the sum of items 1 and 3, under this section.

Total - \$11.37

6. Standard Total.

This value is the sum of items 2 and 4, under this section.

Total - \$11.31

Percent Standard of Actual.

1. This figure is the ratio of the "Standard Cost" to the "Actual Cost". It is found by dividing the "Standard Cost" by the "Actual Cost".

$$\frac{11.31}{11.37} = 99.5\%$$

Supervision "Point" Hour.

1. This figure is obtained by multiplying the "Department "Point" Hour" by the "Percentage Standard of Actual".

$$75.6 \times 99.5\% = 75.2$$

Base for Supervision Premium.

1. This figure is a value of 60, the same as the operator's base. The premium that is paid to supervision depends upon the degree to which the supervision "point hour" exceeds this base of 60.

Premium "Points".

1. This value is the difference between the "Supervision "Point" Hour and the "Supervision Base".

$$\text{Premium "Points"} = 15.0$$











[illegible]





## CHAPTER XIV

### THE "POINT" AS A CONTROL UNIT





## THE "POINT" AS A CONTROL UNIT

In order to derive the maximum amount of benefit from a "point" system application the management must not limit the plan to that of a wage incentive entirely. Although the incentive to labor is the outstanding feature of the plan there are many other possible advantages to be had from the use of the "point" as a unit of measure. The "point" is a valuable aid in planning production as will be explained later in this chapter.

The outstanding responsibility of a department foreman is the maintaining of a satisfactory operator's "point" hour in his department. Along with this he must also keep the controllable items of waiting time, breakdown time, machine assignment time, and any other allowed hours at a minimum because these items affect the department "point" hour and the final department criterion is the supervision "point" hour. This last value is an index or measure of the entire department and indicates the effectiveness of its operation.

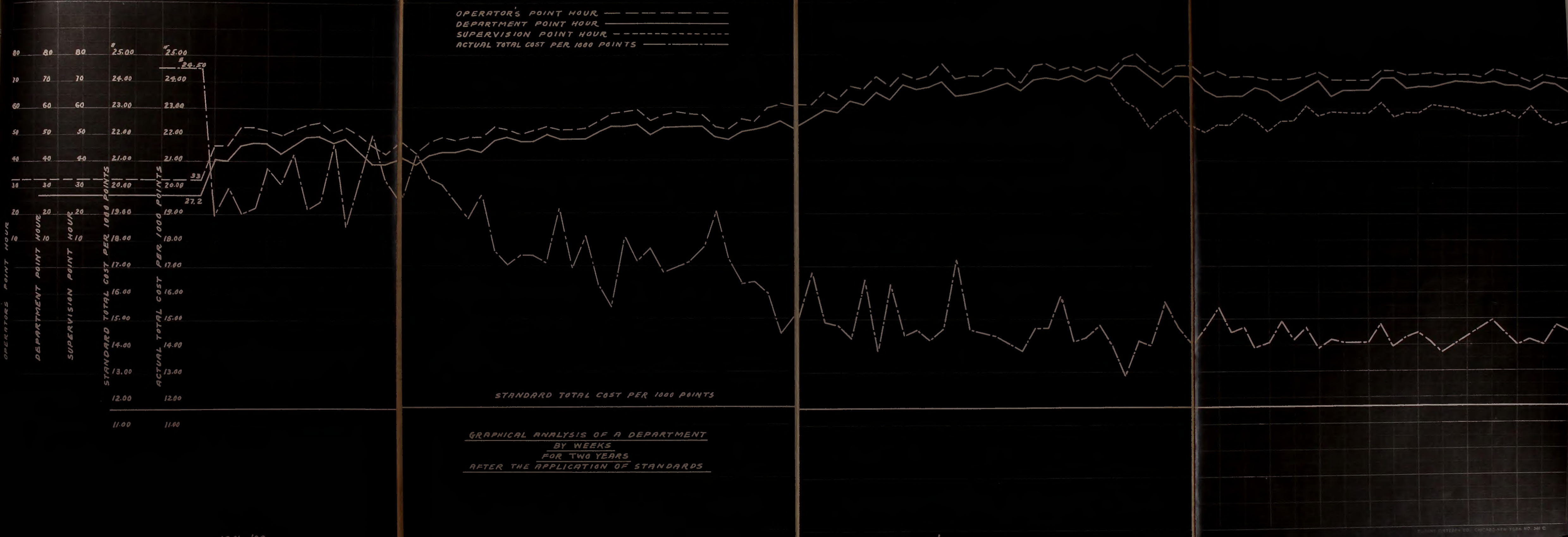
To make clear just what happens after a department is put on standard and to show graphically the trends of the "point" hours and their resulting effect on labor costs, a two year analysis of a department follows this page. A detailed consideration of these plots will be given to bring out the trends indicated by the plots.

### Operator's "Point" Hour.

This curve indicates the trend of operator's "point" hour by weeks. A study of this curve indicates that the department started













with an operator's "point" hour of 33. This is the starting "point" hour of a typical department that has been on day work. The increase in "point" hour is apparent immediately after application in this case but in some cases the starting "point" hour is continued for a period of several weeks while the operators are adapting themselves to the new plan. In this case there is a steadily increasing trend for a period of seven months before the operator's "point" hour reaches the normal of 60. This particular department had only about twenty direct operators and is therefore subject to marked changes in "point" hour if a few operators make poor showings as time goes on. The operator's "point" hour continued to rise until it crossed the 70 "point" hour mark approximately forty eight weeks after application. Recalling that this department started at a 33 "point" hour there is now evident an increase of 110 percent in the operator's "point" hour over the initial value. After a period of sixteen months the "point" hour reached 80 and for the balance of the two year period it fluctuated between 70 and 80. Once the direct operators become convinced that the standards set up will not be changed, unless the method of performing the operation is changed, they will increase their effort, as is indicated by the range of this analysis. In this particular case we have an increase in the operator's "point" hour from a 33 to an 80, or an increase of 142 percent. The amount of this increase will vary in different departments and depends greatly upon whether part of the department had any type of incentive in force at the time of applying the department.

#### Department "Point" Hour.

This plot has the same general trend as the operator's "point"







hour curve. The reason for this is evident when we recall that the department "point" hour is the operator's "point" hour modified by the number of allowed hours for the department. The ideal department would have a department "point" hour curve that coincided with the operator's "point" hour plot, but in any department there is almost certain to be a certain amount of waiting time, breakdown time, and machine assignment time that has not been eliminated. These items are controllable, however, and their magnitude is largely dependent upon the effectiveness of supervision. The proximity of the department "point" hour curve to the operator's "point" hour curve is, therefore, an indicator of the degree of effectiveness of the departmental supervision.

In this particular case the department "point" hour started at a value of 27.2. Immediately after the department was applied there was a noticeable increase in the "point" hour. The increasing trend continued until it passed the normal of 60, eleven months after application. Seven weeks later the department "point" hour passed 70 and continued, with minor fluctuations, about this figure for the balance of the period under consideration. This increase of the original "point" hour of 27.2 to the value of 70, indicates an increase of 157 percent. Recalling that the increase in the operator's "point" hour for the period was 142 percent, it is evident that the supervision in this department has made a good showing in reducing the allowed hours incident to direct production. In other words, the department "point" hour curve has had a greater percentage increase than the operator's "point" hour curve. This indicates that the gap between these two plots is decreasing in its trend and the department







"point" hour is approaching the operator's "point" hour. Such a trend indicates that the department supervision is effective in reducing the controllable hours in the department.

Actual Total Cost Per 1000 "Points".

This curve indicates the total labor cost per thousand "points" of work produced in the department. The trend of this curve will be directly opposite to that of the "point" hour curves. This is evident when we consider that "point" hours are an index of production and at low "point" hours the production is small as compared to normal. With this condition, the labor costs are spread over comparatively few "points" and the cost per "point" is high. As the "point" hour increases the number of "points" earned increases and the labor cost spread is over a large number of "points", with a resultant lower cost per "point" produced. As a single "point" is too small a unit on which to base a comparative cost in an analysis of this type, a unit of 1000 "points" is used. Reference to the curve indicates that the cost per 1000 "points" started at \$24.50. This cost, of course, is in conjunction with the low starting operator's "point" hour. There was an immediate dip in the cost curve after application due to the increase in the operator's "point" hour. After a period of three months, during which there was no appreciable change in the cost curve, there is the beginning of a marked decreasing trend. This decrease continued for a period of a year before it reached its lowest point of \$13.00 per 1000 "points". This represents a decrease of 47 percent of the original cost of \$24.50. This low point on the cost curve was coincident with the attainment of an 80 operator's "point" hour. For the balance of the two year period the cost per 1000 "points" has been





approximately \$14.50. This figure is only 60 percent of the cost at the time of application and indicates a reduction of approximately 40 percent in the labor cost of the department.

#### Standard Total Cost Per 1000 "Points".

This figure is practically a constant because it indicates the cost per 1000 "points" at the standard base rates of the department operations. As the operators are shifted around the department on various classes of work there may be a slight difference in the direct cost, but it is very slight as is indicated by the plot.

#### Supervision "Point" Hour.

This curve is the real criterion of the effectiveness of the department and indicates the degree to which the department approaches standard conditions. The supervision "point" hour is not calculated until after the standard indirect cost has been set up. This will usually come some time after applying the department. In this particular case the standard indirect cost was not set up until the department had been on standard well over a year. The supervision "point" hour started at a 70 due to its coincidence with the peak of 80 on the operator's "point" hour curve. It immediately receded to 50 in the next two weeks. From this point for the balance of the two year period there is apparent an increasing trend up to a 70 "point" hour value.

The above description of the facts indicated by the two year plot is given to help visualize the results obtained in a department after applying standards. The diverging tendencies of the "point" hour curves and the actual total cost curve indicates increased production,





increased employee earnings, and decreased unit costs. These three results are the objectives of a modern scientific plan of wage payment.

In order to show the trend of the factors mentioned for two additional years, a four year plot is shown following this page. It is evident from this plot that the "point" hour and cost curves are running more nearly uniform than during the first two year period. The changes are most marked, of course, during the first two years but the savings are continuing as is evident by the even trend of the curves. This four year plot proves conclusively that the savings realization is continuous.

#### The "Point" in Production Control.

It is possible by means of the "point" to predetermine the productive capacity of a department and the number of people required for that given production. Knowing the department "point" hour it is also possible to determine how soon any particular volume of work can be done because it will be equal to the total "points" to be produced for the required volume divided by the product of the department "point" hour and the number of people on the particular work. The department "point" hour is the index of the rate of producing "points" in the department. To find the number of people per week necessary to produce the total "points" required it is only necessary to divide the total "points" by the number of "points" that an operator on the particular job would earn in a week at the department "point" hour rate. It is possible to get comparisons of different pieces of equipment so as to determine the rate of flow of the product through the equipment. It is thus possible to determine what the "neck of the









JAN. '26

PLUMMER ENGINEERING CO. CHICAGO NEW YORK LOS ANGELES







JAN '26

JAN '27

JAN '28

JAN '29

JAN '30

GRAPHICAL ANALYSIS  
 OF A DEPARTMENT  
 FOR 204 YEARS  
 AFTER THE APPLICATION OF J-410-226





bottle" is as far as equipment is concerned in any given department.

#### The "Point" in Methods Work.

By comparing "point" standards for different operations and various routings and costing these "point" standards at their respective base rates it is possible to determine the most economical method of manufacture. This is a use to which the "point" is put continually as it provides a ready method for making cost comparisons.

#### The "Point" as a Basis for Standard Costs.

Due to the fact that all operations in the entire plant have standard base rates it is possible to use the "point" as a basis for the determination of the standard cost of any particular operation or group of operations. As the base wage for any particular operation is for a normal, or 60 "point" hour, it is easy to determine the monetary value of a "point" at any base rate. It is equal to the base rate divided by 60. Knowing the money value per "point" it is only necessary to multiply the "point" standard by this figure to determine the direct labor cost. If the burden is allocated on a labor dollar basis the total cost can be obtained by adding the burden percentage in each case to the direct labor cost and the sum of these individual values will be the total cost for all of the operations. Below is a typical cost calculation for the determination of a standard cost.

Operation	Point Standard	Base Rate	Dir. Labor Cost	Burden Percentage	Total Cost
#1	4.6	48	\$.037	150	\$.092
2	18.3	51	.155	220	.496
3	6.2	54	.056	240	.190
4	4.7	45	.035	175	.096
5	2.3	54	.021	250	.073
					<u>\$.947</u>







The standard cost for this particular group of operations is equal to \$.95 approximately.

The use of standards is especially helpful in estimating costs for quoting prices. From the tables of standards set up covering wide ranges of work on all kinds of equipment, the proper standards can be selected for the desired routing and the standard cost figured as in the illustrative example just given.

#### The "Point" as a Statistical Unit.

With the use of the "point" it is possible to make comparisons of different people, departments, or even plants. Without some common measure such comparison would be impossible because production would be noted in number of pieces and as such a unit bears no relationship in different types of work and industries it is not possible to make accurate comparisons. However, with the "point" available as a common unit of measure it is possible to compare the effectiveness of a plant making saws with a plant making automobile tires, or with a textile mill. In order to make comparisons of this type it is necessary to have a suitable unit and the "point" supplies this unit.

#### The "Point" in Comparing Payroll and Production.

The "point" lends itself readily to comparing volume of production to the magnitude of the payroll for that production at different times due to the fact that the "point" can be readily transferred into a monetary value because of the standard base rates. A comparison of this type follows.





TABLE I  
COMPARISON OF PRODUCTION FOR  
TWO DIFFERENT PERIODS.

	First Quarter			Last Quarter		
	No. Pcs.	Ave. pt. Strd.	Total Points	No. Pcs.	Ave. pt. Strd.	Total Points
Group 1	352	20.5	7216	2393	20.5	48955
	16	39.5	632	55	39.5	2173
Group 2	148	22.2	3286	1763	22.2	39138
Group 3	857	102.9	88185	1579	102.9	162479
Group 4	8277	12.3	101807	10197	12.3	125423
	1057	19.0	20083	684	19.0	13000
	105	36.9	3875	79	36.9	2915
Group 5	246	108.0	26028	357	108.0	38556
Group 6	49253	2.0	98506	33895	2.0	67790
Group 7	9259	4.1	37962	14843	4.1	60856
Group 8	2790	12.3	34317	3251	12.3	39987
	762	19.0	14478	701	19.0	13319
	96	26.9	3540	147	36.9	5424
Group 9	483	12.3	5941	391	12.3	4810
	49	19.0	931	27	19.0	513
Group 10	108	19.5	21060	100	19.5	19500
	1	70.2	70	5	70.2	351
Group 11	1034	19.5	20163	931	19.5	18154
	103	70.2	7231	97	70.2	6810
Group 12	12813			11572		
	250	40.0	10000	230	40.0	9200
	346			384		
	3	40.0	120	4	40.0	160
Group 13	12513			15006		
	350	33.5	11725	420	33.5	14070
Group 14	5665			3176		
	160	33.5	5360	90	33.5	3015
Totals	75413		522348	72239		696473
Weekly Ave.	5801		40200	5556		53700





TABLE II  
COMPARISON OF PAYROLL AND PRODUCTION  
FOR BOTH PERIODS OF TABLE I.

<u>First Quarter</u>		
Week Ending	Payroll	Hours
1/9	\$766.17	1300.4
1/16	624.31	1127.2
1/23	577.47	1062.0
1/30	717.73	1261.8
2/6	737.53	1303.6
2/13	722.36	1257.6
2/20	700.01	1241.7
2/27	588.58	1027.0
3/6	762.46	1331.8
3/13	731.56	1264.9
3/20	782.30	1376.9
3/27	<u>779.68</u>	<u>1355.5</u>
12 Weeks Total	\$8490.16	14910.4
Weekly Average	707.51	1242.5

<u>Last Quarter</u>		
10/2	50%	414.26
10/9		914.38
10/16		647.32
10/23		889.64
10/30		938.93
11/6		732.45
11/13		721.87
11/20		697.70
11/27		461.21
12/4		740.98
12/11		747.55
12/18		758.20
12/25		<u>535.45</u>
13.5 Weeks Total		\$9910.29
Weekly Average		734.10





## TABLE III

## SUMMARY

	First Quarter	Last Quarter
Total Pieces Produced	75413	72239
Average Pieces Produced Weekly	5801	5556

Percent Decrease in Production Based on Pieces - 4.2%

Total Point Production	522348	696473
Average Weekly Production	40200	53700

Percent Increase in Production - 33.5%

Total Payroll	\$8490.16	\$9910.29
Average Weekly Payroll	707.51	734.10

Percent Increase in Payroll - 3.8%

Total Cost First Quarter	\$17.51 per 1000 Points
Total Cost Last Quarter	<u>13.61</u> per 1000 Points

Savings per 1000 Pts. \$3.90

Average Savings per week for Last Quarter -

$$\frac{\$3.90 \times 53,700}{1000} = \$209.00$$





There may be many other uses to which the "point" may be put to aid management in its control of manufacturing detail. These possibilities will depend upon the relationships that exist on the particular application. It should be evident from this chapter that the "point" system is an invaluable aid to management as a control medium in addition to its outstanding features as a plan of wage incentive.





## CHAPTER XV

### SUMMARY





## SUMMARY

The "point" system is more than an incentive plan of wage payment in that it forms a means of analyzing and controlling the cost, effectiveness and compensation of direct and indirect labor in the factory and office. This thesis has been confined largely to the consideration of the "point system" as it affects productive workers. The field for possible applications is not limited to the productive phase of industry alone. Any type of work involving repetitive motions can be analyzed and accurate standards determined. Office work is a field that is being studied today with the intention of making possible marked savings in the indirect personnel of the organization. There are several applications in use at the present time on such office operations as typing orders, factory records and routings and the figuration of factory time cards. Any type of work that will lend itself to analysis readily offers a possibility for application.

The chapter on The "Point" as a Unit of Control, indicated a few of the possible uses to which the "point" may be put as a unit of measure. A possibility not mentioned is the development of ratios of indirect time to direct "points" produced. It is a comparatively simple matter to take into consideration such indirect items as supervision, cleaning, trucking, handling, and any other indirect items in a department and develop ratios between their magnitude and the direct "points" produced. These values will then act as barometers for the departments for the many factors under consideration.





One of the features of the "point system" is that with a little additional work for the determination of the above mentioned factors it is possible to educate the entire organization into thinking and talking the same language. This makes it easily possible to shift help from one department to another, to combine the work of various departments, and reduce the labor force to a minimum. The combination of these various forms of data then makes it possible to intelligently plan, schedule, and dispatch labor, material and equipment as to when, where, and how many. It also makes available most of the information necessary to intelligently budget and quite accurately to predetermine costs of manufacture.

Every one in industry is attempting, with varying degrees of success, to balance capacity and requirements, to establish and maintain control of raw, in process, and finished materials, as well as labor and overhead. It is only logical that, wherever possible, all the records or measuring devices available should be used to accomplish this end and thereby reduce the burden.

If, without extensive calculations and difficult interpretation, it is possible to give the supervisory staff a means to know exactly what is being done, compared with what can be done, and to know the true measure of usefulness of their men and equipment, the real value of their gains and losses, the true measure of themselves in comparison with other men in their class, these supervisors may be counted upon to work to the best of their ability toward any improvement of conditions that will increase the measure of usefulness of their men and of themselves.





No plan will do any of the above mentioned by itself alone. A good, able management is also necessary because the "point system" is only a tool or measuring device made available for management in attaining its objective.

If industry is given the use of a common term and a constant unit of measure that places a true value on all work done, on all men employed - both labor and supervision - giving the exact extent of all gains and losses, controlling all changes in process of manufacture, all expressed in a manner that is easily understood, and permitting, through its simplicity, a continuous grasp of the entire situation, it will be possible to transform useless efforts into useful ones.





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1. There is very little information or data available at the present time on the "point system" of wage payment. Literature on management subjects gives only the basic principles underlying the plan. This is due to several reasons of which, perhaps, the most outstanding is the fact that applications of the "point system" are made by professional engineering staffs. Another reason is the fact that the "point system" is a comparatively recent development.

The material for this thesis has come from the author's experience in the field of industrial engineering.

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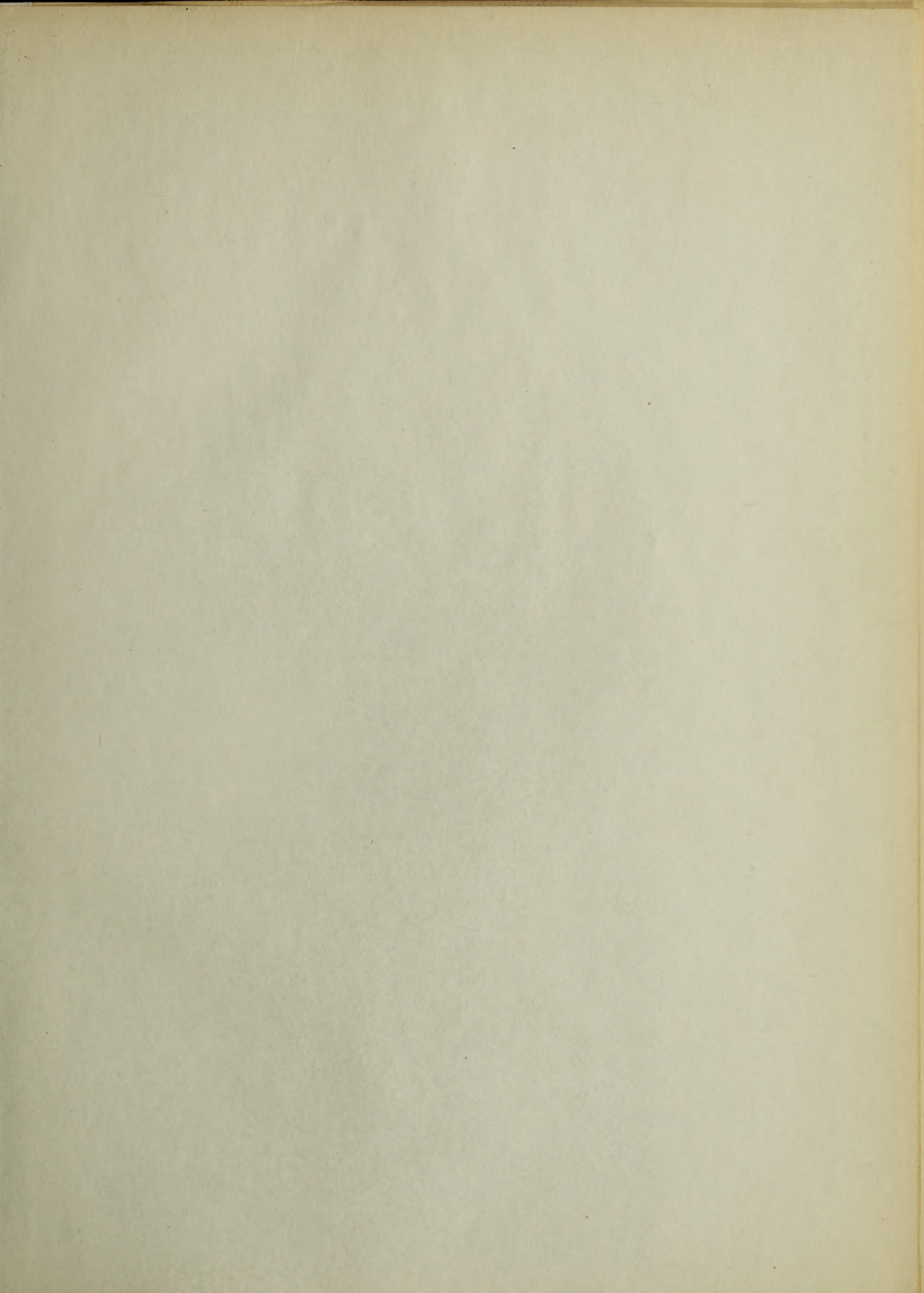


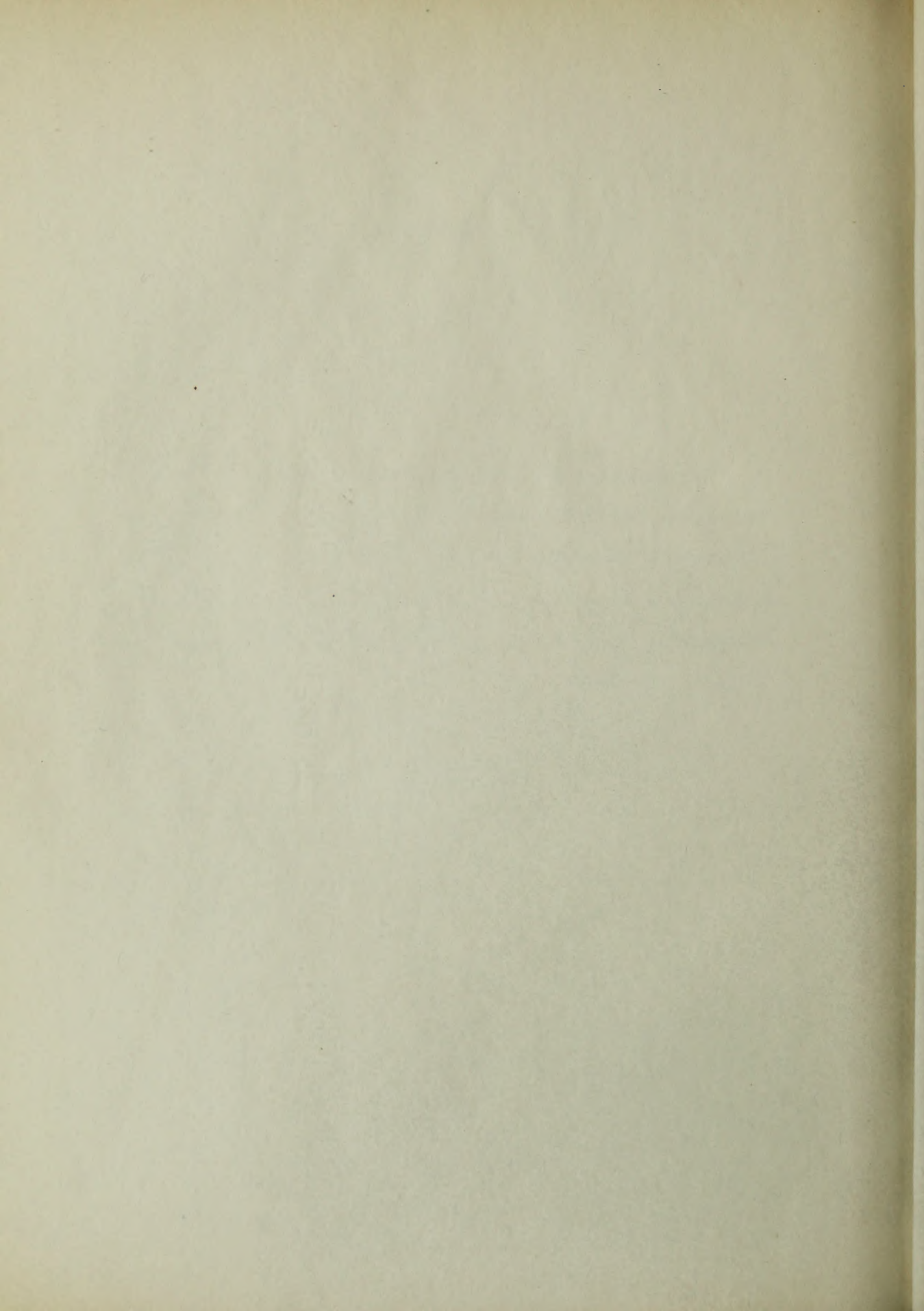
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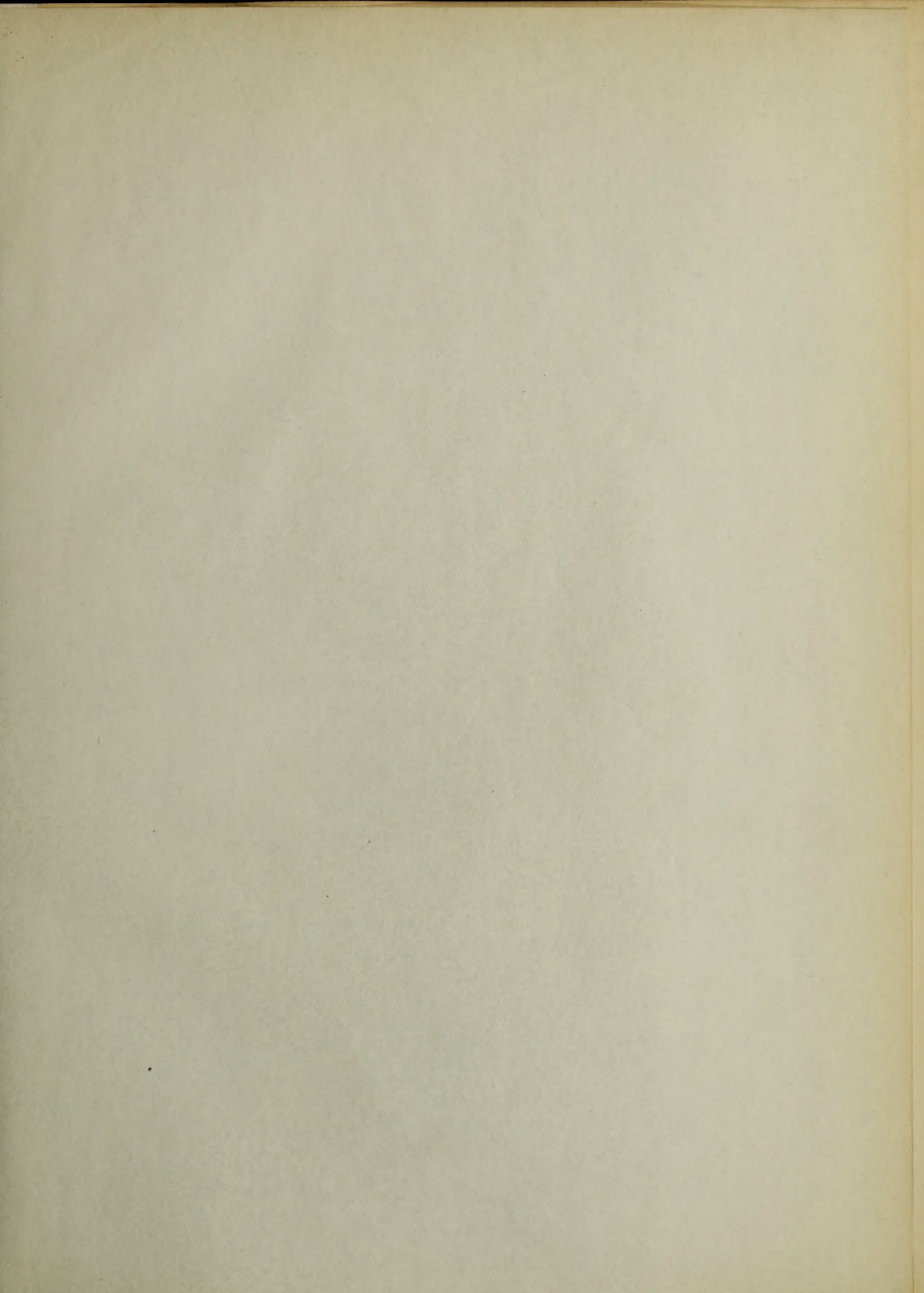
























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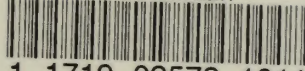
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